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FOOD TECHNOLOGY ABSTRACTS

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FOOD
TECHNOLOGY
ABSTRACTS

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CONTENTS

ABBREVIATIONS

A	ampere
AAS	atomic absorption spectrometry
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
°C	degree centigrade
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetraaceti acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gr	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short tim
Hz	hertz [frequency cycles/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcalk, kg]
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
M	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, etc
N	Normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	Poise
p	probability
Pa	pascal (N/M^2)
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	South, Southern, etc.
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West,Western,etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro–[as in g, μm]
%	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

ABBREVIATIONS FOR LANGUAGES

Language of text	
Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
Spanish	Es
Swedish	Sv

GENERAL

1400

Ranganathan (S), Dillikumar (PK), Ramamoorthy (P) and Vinodini Reddy. **Large scale production of iron fortified salt.** *Journal of Food Science and Technology (India)* 30(3): 1993: 166-168

A new process that can produce iron fortified salt (IFS) on a large scale (3-4 metric tons/h) has been developed for the first time in India in a salt factory at Ramanathapuram, Tamil Nadu State. In this process, common salt is mixed with 0.5% each of $FeSO_4$ and NaH_2PO_4 in a ribbon blender. The dry mixing is superior to the other method based on spraying of a sol. of $FeSO_4$, monosodium orthophosphate and $NaHSO_4$ over common salt. The spray-mixing method encountered operational problems on account of stickiness of the components and it also requires additional equipment such as dryer. The need for this is eliminated in the dry mixing process. Also, the product obtained by the spray-mixing process developed yellow colour on storage. IFS obtained by the dry-mixing process remained colourless during prolonged storage at ambient temp. Iron distribution in the IFS was also found to be uniform. Various food items prepared using the IFS of dry-mixing process were indistinguishable from those containing unfortified salt in colour, taste, flavour or texture. The IFS conforms to the standards of the PFA rules. AA

1401

Vasishtha (AK), Pathak (JP) and Lehri (A). **Studies on solvent extraction of neem seed (*Azadirachta indica*).** *Journal of the Oil Technologists Association of India* 34(3): 1992: 75-80

To obtain oil and deoiled meal free from bitters and odoriferous compound (non-lipid associates), neem seed (*Azadirachta indica*) kernel was given single stage pre-treatment with isopropanol, acetone and ethanol in pure and aqueous forms. Aqueous ethanol (water:ethanol 15:85 v/v) at 55°C for 8 h in 3 stage counter-current pretreatment was found optimum. GS

1402

Lakshminarayana (G), Prasad (RBN), Netta Kumari (B), Manjula (K) and Krishnamurthy (A). **Preparation and surfactant properties of diethanolamides of castor, karanja and neem seed proteins.** *Journal of the Oil Technologists Association of India* 24(4): 1992: 111, 113, 115

Diethanolamides of proteins were prepared by cleavage of protein isolates of castor, karanja and neem oil cakes with diethanolamine and evaluated for their surfactant properties. The wetting, foaming and emulsification abilities of the products were inferior, and surface tension lowering ability, calcium tolerance and detersive power were superior to those of sodium lauryl sulphate (SLS). The critical micelle concn. values were low, though higher than for SLS. These surfactants could have commercial potential since they are obtained from cheap non-edible oilseed proteins and do not require fats or fatty acids which are in short supply. AA

1403

Mattila-Sandholm (T) and Wirtanen (G). **Biofilm formation in the industry : A review.** *Food Reviews International* 8(4): 1992: 573-603

This review describes the diversity of biofilm as a phenomenon and assesses its significance in the process industry. A brief section on methodology in biofilm research is included. Biofilm formation and its consequences, the occurrence of biofilm in industrial systems and related problems (drinking water systems, cooling water systems, process industry, chain conveyor lubricants, air conditioning systems, medical and instrument industry) are the other aspects covered. 206 references. SRA

FOOD PROCESSING

Nil

FOOD PACKAGING

Packaging materials

Plastics

1404

Roy (SK) and Pal (RK). **Use of plastics in post-harvest technology of fruits and vegetables - a review.** *Indian Food Packer* 47(1): 1993: 27-45

Reviews the use of plastics in different stages of handling, packaging, dehydration, freezing, aseptic packaging, storage, transportation and processing of fruits and vegetables. Deals with the indirect role of plastics in the creation of modified atm. (MA), trapping of ethylene to delay fruit ripening, wound healing in mechanically harvested fruits, inhibition of milling injury of fruits, for preparation of wax emulsion and irradiation. The chemical and

sensory quality of food products packed in plastics are also covered. 171 references. GS

FOOD ENGINEERING AND EQUIPMENT

Equipments

1405
Shukla (BD) and Patil (RT). **Dryers and drying technology for food crops.** *Indian Journal of Agricultural Sciences* 62(9): 1992: 579-589

Several types of dryers with different drying capacities developed in India for drying of wheat, rice, sorghum, coconut and soyabean at farm level are listed. Commonly used drying techniques viz., sun, infra red, conduction, heated air, desiccated air and refrigerated air drying techniques and those useful for drying, potato, rice, wheat, copra, soyabean, pepper, arecanut, cardamom are discussed. KAR

1406
Lu (Q), Hsieh (F), Mulvaney (SJ), Tan (J) and Huff (HE). **Dynamic analysis of process variables for a twin-screw food extruder.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 261-270

The dynamic responses of twin-screw food extruder were investigated. Step changes in screw speed, feed moisture content, feed rate and barrel temp. were used to determine the transient responses and steady-state gains of motor torque, die pressure and product temp. in the melting zone for corn meal processed in a co-rotating and intermeshing twin-screw extruder. Increase/decrease in screw speed caused inverse responses in motor torque and die pressure. Increase/decrease in feed moisture content caused overshoot responses in motor torque and die pressure. Motor torque and die pressure were reduced with increases in screw speed, feed moisture content and barrel temp., but were raised with increasing feed rate. Product temp. was elevated with increases in screw speed and barrel temp., but was lowered with decreasing feed moisture content. While the screw speed appeared to be the most effective control variable for motor torque and die pressure, the product temp. was more effectively controlled by the feed moisture content and/or barrel temp. set point. AA

ENERGY IN FOOD PROCESSING

Nil

Chemistry

1407
Maga (JA). **Pyrazine update.** *Food Reviews International* 8(4): 1992: 479-558

The pyrazine literature from the early 1980s to the present is reviewed. Aspects considered include: food-related occurences, (alfalfa and red colour extracts, bakery items, caramel colouring, cereals, cheese, cocoa, coconut, coffee, distilled spirit, legumes, malt, meats, milk, *miso*, *natto*, nuts, potatoes, seafoods, wine, yeast extract), nonfood occurences (insects, mammals, microbial cultures), model system studies, flavour properties and formation pathways. 229 references. SRA

Chemistry (Analytical)

1408
Majumdar (TK) and Agarwal (RM). **Determination of uric acid in insect infested foodstuffs.** *Bulletin of Grain Technology* 29(3): 1991: 143-147

Method developed based on the reduction of phosphomolybdic acid by uric acid in the presence of alkali is claimed to be sensitive to detect even 0.8 mg uric acid in 100 g of sample. SD

1409
Abdallah (AM), El-Defrawy (MM) and Hassan (AEM). **Determination of mercury in foods and water by cold vapour atomic absorption spectrometry.** *Journal of the Indian Chemical Society* 69(10): 1992: 699-701

Influence of bromide, bromate, iodide, iodate, periodate, sulphite and thiosulphate on the detn. of mercury was examined for acidic and alkali media. Depressing effect of these inorganic sp., in acid medium showed that the severity of the decrease was in decreasing order: iodine compounds > sulphide > sulphite > thiosulphate > bromine compounds. Presence of increasing amounts of interfering sp., increased the depressing effect without more infections. Presence of Sn^{II} chloride sol., only one equilibrium was attained between mercury and the interfering sp., irrespective of its original oxidation state. SRA

1410
Ananda Vally (N). **Water analysis - an overview.** *Seafood Export Journal* 25(3): 1993: 5-7

Reviews the quality of water used in seafood processing: physical, chemical and bacteriological characteristics for testing water quality: routine tests used in the bacteriological examination of water: use of hightech analytical instruments like inductively coupled plasma emission, AAS and GC for water analysis: and prevention of water pollution by proper chlorination and reduction of toxic chemical contaminants in water. GS

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

1411

Filova (V), Valentova (O), Daussant (J) and Kas (J). **Some methods for isolation and assays of enzymes occuring in cereals and legumes.** *Food Reviews International* 8(4): 1992: 559-572

This paper presents a brief overview of procedures available for separation, isolation, identification and localization of enzymes in cereals and legumes. A number of methods, and their combinations for quantitative detn. and purification of enzymes is also convered. Modern immunochemical methods, affinity techniques, and various types of labeled substrates facilitate the investigation of previously unsolvable problems. 135 references. SRA

Microorganisms

Bacteria

Listeria

1412

Razavilar (V) and Genigeorgis (C). **Interactive effect of temperature, atmosphere and storage time on the probability of colony formation on blood agar by four *Listeria* species.** *Journal of Food Protection* 55(2): 1992: 88-92

The probability (P) of one *Listeria* cell and the cells needed to initiate colony formation on sheep blood agar plates as affected by atmospheric conditions (AC), storage temp. (T), time (t), and *Listeria* species was evaluated. The factorial design experiments included *Listeria monocytogenes* (2 strains), *Listeria seeligri*, *Listeria ivanovii* and *Listeria innocua*, as test organisms, storage of the plates at 4, 8, 20 and 30°C under air (A), modified atm. (MA) of 5% O_2 + 10% CO_2 + 85% N_2, 100% CO_2 (CO_2), vacuum (V), and candle jar (CJ) for 7, 14, 21, 42 and 56 days. Statistical analysis indicated the significant effect of AC ($p < 0.0004$), T ($p < 0.0001$), t($p < 0.0001$) but not of species ($p > 0.71$). None of the interactions with atmospheric conditions were significant (AC x species, Ac x t, AC x T, all with $p > 0.46$). Pairwise comparison of the P's for each of the AC's indicated that 100% CO_2 was significantly more inhibitory to growth initiation than any other AC ($p < 0.004$). No difference among the other AC's was shown. The effect of CO_2 on delaying growth of *Listeria* was enhanced with decreasing storage T. Thus, under CO_2, less than or equal to 6 cells of *L. monocytogenes* formed a colony within 7 days at 20°C and 42 days at 4°C. L. ivanovii *was the most sensitive to* CO_2 and required 4.7×10^4 cells to form a colony after 42 days at 4°C. CO_2 (100%) extended the lag phase at less than or equal to 8°C and decreased the rate of growth of the test organisms at 4°C but not at a higher temp. AA

Listeria monocytogenes

1413

Linton (RH), Webster (JB), Pierson (MD), Bishop (JR) and Hackney (CR). **The effect of sublethal heat shock and growth atmosphere on the heat resistance of *Listeria monocytogenes* Scott A.** *Journal of Food Protection* 55(2): 1992: 84-87

Log phase cells of *Listeria monocytogenes* Scott A were heat shocked in Trypticase Soy + 0.6% yeast extract (TSYE) broth at 48°C for 10 min, followed by heating at 55°C for up to 50 min. Heat resistance was determined using nonselective (TSYE) and selective (McBride *Listeria*) enumeration media which were incubated under aerobic and anaerobic environments. D_{55} C-values for heat shocked cells were 2.1-fold higher than nonheat shocked cells (18.7 min vs. 8.89 min) when cells were enumerated on TSYE agar aerobically and 2.2-fold higher (26.4 min vs. 12.0 min) for cells enumerated anaerobically on TSYE agar. When cells were enumerated aerobically on McBride *Listera* (ML) agar, D_{55} C-values for heat shocked cells were 1.4-fold higher than nonheat shocked cells (9.55 min vs. 6.69 min). No growth was observed on ML agar anaerobically. The physiological condition of the microorganism, the enumeration medium, and the growth enumeration medium, and the growth environment greatly affected the heat resistnce of log phase cells of *Listeria monocytogenes* Scott A. AA

Fungi

Fusarium

1414

Clear (RM) and Patrick (SK). **A simple medium to aid the identification of *Fusarium moniliforme*, *F. proliferatum*, and *F. subglutinans*.** *Journal of Food Protection* 55(2): 1992: 120-122

Growth of *Fusarium moniliforme*, *F. proliferatum*, and *F. subglutinans* on Czapek sol. agar containing 20% saccharose resulted in both cultural differences and enhanced micromorphological features. *F. moniliforme* could be reliably distinguished from the other 2 species based on differences in colony colour and texture. These differences were intensified by lowering the pH of the media from 7.7 to 4.4 without adversely affecting micromorphology. AA

Mushrooms

1415

Gow-Chin Yen. **Effects of heat treatment and storage temperature on the biogenic amine contents of straw mushroom (*Volvariella volvacea*).** *Journal of the Science of Food and Agriculture* 58(1): 1992: 59-61

The changes in the biogenic amines tryptamine, 2-phenylethylamine, putrescine, cadaverine, histamine and tyramine of straw mushroom *Volvariella volvacea* (Bull. ex Fr) Sing produced by heat treatment and during storage at different temp. were studied. About 80% of the original content of these amines was lost during cooking. Commercial canned straw mushroom contained low amounts of amines. The amine contents of straw mushroom increased during storage at 4°C, with particularly notable increases in the concn. of 2-phenylethylamine and tyramine after 5 days' storage. However, the levels of all amines increased more markedly during storage at 25°C, and the increases in the putrescine and cadaverine concn. were much greater than those reached at 4°C. AA

Phycomyces blakesleeanus

1416

Shlomai (P), Margalith (P) and Mokady (S). **Nutritional evaluation of the fungus *Phycomyces blakesleeanus* as a protein source.** *Journal of the Science of Food and Agriculture* 58(1): 1992: 125-128

The quality of the protein of the carotenogenic fungus *Phycomyces blakesleeanus* Burgeff, strain NRRL 1555 (-), was evaluated with rats and observed to have a protein efficiency ratio of 1.4. The limiting amino acids were tryptophan, sulphur-containing amino acids, lysine and isoleucine. Upon incorporation into diets containing 100 g kg^{-1} protein the proportions of the above mentioned amino acids of the optimal recommended dietary allowances for growing rats were 33.0%, 57.4%, 74.5% and 87.2% respectively. Furthermore, the fungal protein was found to contain an excess of histidine about 8-fold more than the recommended dietary allowance for growing rats. Some safety aspects were examined and, although the fungus was consumed in high dietary concn., 242 g kg^{-1} of the diet, no pronounced toxicological effects were observed. AA

Yeasts

1417

Gogte (S), Rukhmini (C) and Polasa (K). **Single cell oil from oleaginous yeasts.** *Journal of the Oil Technologists Association of India* 34(3): 1992: 95-98

Single cell oil (SCO) of 6 newly isolated oleaginous yeasts were evaluated for their physico-chemical characteristics, fatty acid composition and analysis of fat in comparison with the vegetable and animal fat. Results indicated that they were found to be nutritionally good being comparable to vegetable oils like groundnut, cottonseed, kapok and sesame. Oleic acid was the major fatty acid of all SCO. PUFA contents were high. GS

BIOTECHNOLOGY

1418

Sanjeev Kumar. **Biotechnology in the improvement of poultry production in India.** *Poultry Guide* 30(4): 1993: 44, 49

Techniques of restriction fragment length polymorphism (RFLP) as a method of genetic improvement of poultry is discussed.

1419

Ramachandran (S) and Sinha (S). **Bioconversions.** *Indian Journal of Microbiology* 33(1): 1993: 25-34

Reviews the control strategies, process engineering, scale-up, cost analysis, socio-economic and environmental factors related to bioconversion technology. Utilization of bioconversion processes for - conversion of agro-cellulosic residues to animal feed and food; energy and chemicals, microbial dewaxing of petroleum fractions, treatment of industrial wastes, pollution control, microbial biodegradation of crude oil etc. are also discussed. 33 references. GS

TISSUE CULTURE

Nil

FOOD ADDITIVES

1420

McLellan (MR), Kime (RL) and Lind (LR). **The effect of fill temperature and bottle type on visual characteristics of vinegars during storage.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 275-279

A study was undertaken to compare the effect of various fill temp. using standard glass vinegar bottles and HDPE vinegar bottles in an extended storage test. Using the process applied in this study, it was found that bottling in both glass and HDPE plastic containers could be done at substantially reduced temp. from the current typical practice of filling at 60°C. Fill temp., independent of pasteurization temp., had only a minor influence on product quality. Oxidation was measureable in HDPE containers to a greater extent than in glass containers. AA

Colourants

Anthocyanins

1421

Shenoy (VR). **Anthocyanins - prospective food colours.** *Current Science* 64(8): 1993: 575-579

Factors responsible for destabilizing anthocyanins (which includes enzymes, processing temp., storage condition, light, oxygen, pH, vitamin C, carbohydrates, metals and sulphur dioxide) and the attempts made so far to use them for colouring food are reviewed. 52 references. KAR

CEREALS

1422

Charanjeet Kaur Hira and Anupinder Pal Kaur. **Phytate/zinc and phytate X calcium/zinc ratios of common cereals, legums and their combinations.** *Journal of Food Science and Technology (India)* 30(3): 1993: 213-215

Zinc availability from common cereals, legumes and their combinations were studied using different availability indicators. The level of HCl-soluble Zn ranged from 46.3 - 81.9%. Phytate/Zn molar ratio was < 20 for cereal-legume combinations, while phytate x Ca/Zn molar ratio for cereals and cereal-legume combinations was < 50 mM/100 g. No association was observed among HCl-soluble Zn, phytate/Zn and phytate x Ca/Zn ratios. AA

1423

Claudia Falabella (M), Aguerre (RJ) and Saurez (C). **Modelling non-isothermal sorption equilibrium data of cereal grains.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 286-288

Water activities of corn, sorghum, rough rice and wheat were determined at 20, 30, 40 and 50°C for different moisture contents by means of an electronic a_w meter. The equilibrium values and temp. shifts were modelled with a 3 parameter equation in the approximate a_w range 0.2 - 0.9. An analytical expression to calculate the isosteric heat of sorption and its moisture content dependence, was derived. Values for the isosteric heat of sorption calculated from the experimental equilibrium data by means of the classical Clausius-Clapeyron equation were compared with those obtained from the analytical expression. AA

1424

Theander (O), Westerlund (E) and Aman (P). **Structure and components of dietary fiber.** *Cereal Foods World* 38(3): 1993: 135-138, 140-141

The structure and components of dietary fiber (DF) polysaccharides such as cellulose, mixed-linked β-glucans, xylans, arabinogalactants, pectins, xyloglucans and lignin as well as the Uppsala method for the analysis of DF is described in this article. The author also discusses the effect of heat treatment on the content and composition of DF in cereal-based products. CSA

1425

Walker (ARP). **Does the dietary fiber hypothesis really "work" ?.** *Cereal Foods World* 38(3): 1993: 128, 130-134

The author first raises question about how the dietary fiber hypothesis holds up to scrutiny in light of current evidence and then takes a global look at dietary fiber and health or disease. AA

Breakfast cereals

1426

Lorenz (K) and Al-Ruqaie (I). **Alkylresorcinols in commercial and experimental extruded high fiber breakfast cereals.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 248-252

Twenty commercial high fiber breakfast cereals varying in fiber ingredient composition and produced by different companies were analysed for alkylresorcinols (ARs). Alkylresorcinol levels were high when the breakfast cereals contained

unprocessed rye and/or wheat bran, but relatively low when they were made with corn, rice or oat bran. Experimental breakfast cereals consisting of 50% corn grits, 20% full-fat soy flour and 30% of either wheat, rye or triticale bran were extruded under different conditions of moisture (20 and 30%), temp. (80 or 100°C at the feed section and 100 or 150°C at the compression section) and screw speed (100 or 150 r.p.m.). Alkyresorcinol levels in extruded products were lower by 47.4 to 84.2% compared to ARs in the blends before extrusion. Percentage alkylresorcinol reduction depended on the type of bran in the blend and the combination of extrusion parameters used. AA

Rice

1427

Rajendran (B). **Efficacy of neem oil for the control of rice insect pests.** *Madras Agricultural Journal* 79(6): 1992: 359-360

Neem oil at 1, 2, 3 and 4% concn. along with Teepol 0.4% as emulsifier was tested for the control of rice insect pests. Neem oil (4%) reduced the leaf-folder damage to 3.8% compared to 24.4% in the untreated control pests. Neem oil at 3 and 4% doses were also very effective in checking brown plant hopper populations. GS

1428

Bradbury (JH), Hammer (BC) and Sugani (I). **Heat stability of trypsin inhibitors in tropical root crops and rice and its significant for nutrition.** *Journal of the Science of Food and Agriculture* 58(1): 1992: 95-100

The heat stability of trypsin inhibitors from rice (*Oryza sativa* L.), sweet potato (*Ipomoea batatas (L) Lam), taro (*Colocasia esculenta *var* esculenta *(L) Schott), giant taro (*Alocasia macrorrhiza *(L) G Don) and giant swamp taro (*Cyrtosperma chamissonis (Schott) Merr) was studied. Rice trypsin inhibitor (TI) occurred only in the germ, so it is absent from white rice. Taro, giant taro and giant swamp taro (but not rice or sweet potato) showed an initial large increase (one to tenflod) in the amount of TI present on heating at about 80°C. The heat release mechanism, which was accompanied by a change to a rubbery texture in the food, amounted to a breakdown of the cellular structure making TI available for extraction. Such heat release of TI would cause partially cooked food to be deleterious for human consumption. Brown rice, sweet potato, taro and giant swamp taro contained moderate amounts of TI, which was fully inactivated when the boiled or baked food was soft enough to eat. Giant taro, however, contained 10-100 times as much TI (which in this case also inhibited chymotrypsin) as the other foods, and a boiling time of at least 30 min was needed for its inactivation. AA

Wheat

1429

Singh (SPN) and Lallan Rai. **Performance of etrimfos insecticide against *Sitophilus oryzae* and *Rhizopertha dominica* infesting stored wheat.** *Bulletin of Grain Technology* 29(3): 1991: 138-142

Etrimfos (50 EC) i.e. 3, 5 and 8 p.p.m. and malathion (50 EC) i.e. 10 p.p.m. significantly reduced the grain pests *S. oryzae* and *R. dominica*. Both the treatments were equally effective (i) in reducing the % weevilization in RR-21 var. of wheat (ii) in controlling the rice weevil and lesser grain borer in RR-21 var. of wheat and (iii) without reduction in germination of grain even after 2, 4 and 6 months of treatment. SD

1430

Wrigley (CW). **A molecular picture of wheat quality: Finding and fitting the jigsaw pieces.** *Cereal Foods World* 38(2): 1993: 68-70, 72-74

The article first discusses the advances in protein and gluten chemistry and then identifies pieces of the puzzle that may lead to the "big picture" of wheat quality. CSA

1431

Kolster (P) and Vereijken (JM). **Evaluating HMW glutenin subunits to improve bread making quality of wheat.** *Cereal Foods World* 38(2): 1993: 76, 78-82

The author discusses how environmental and genetic variations in the high-mol.-wt. glutenin subunits affect the bread-making quality of flour and then discusses how this information can be used to improve flour performance in other applications. AA

1432

Papadopoulou-Mourkidou (E) and Tomazou (T). **Persistance and activity of permethrin in stored wheat and its residues in wheat milling fractions.** *Journal of Stored Products Research* 27(4): 1991: 249-254

The pyrethroid insecticide permethrin was applied at 2 or 8 mg a.i./kg to wheat, or 2 mg a.i. permethrin plus 10 mg a.i. piperonyl butoxide/kg to wheat, and the wheat seeds were stored for 20 months under ambient condition (17-32°C and 40-60% r.h.).

Bioassays conducted with adults of *Sitophilus oryzae* (L) placed on treated wheat samples indicated that all treatments were effective in controlling *S. oryzae* during storage for at least 20 months. The residues of permethrin and its *cis/trans* isomers were determined in ground whole wheat and its milling fractions, and the time periods for the initial residue levels to be reduced by half, were evaluated. These ranged from 178 to 200, 217 to 231, and 255 days in the ground whole grain, bran and flour, respectively. The residues of permethrin in whole ground grain ranged from 1.378 plus or minus 0.190 (day 1) to 0.247 plus or minus 0.026 mg/kg (day 427) in the wheat treated at 2 mg a.i. permethrin/kg, and from 7.400 plus or minus 0.234 (day 1) to 1.294 plus or minus 0.017 mg/kg (day 427) in the wheat treated at 8 mg a.i. permethrin/kg. There was no indication of any effect of piperonyl butoxide on permethrin residue levels. After 35 days of storage 75 - 80% of permethrin residues were found in the bran portions of seeds subjected to each of the three treatments, while after 427 days of wheat storage at ambient conditions no detectable levels of permethrin residues were found in flour from wheat treated at the rate of 2 mg a.i./kg of wheat. AA

1433

Welch (RW), Leggett (JM) and Lloyd (JD). **Variation in the kernel (1-3) (1-4)=β-D-glucan content of oat cultivars and wild *Avena* species and its relationhip to other characteristics.** *Journal of Cereal Science* 13(2): 1991: 173-278

Kernel (1-3) (1-4)-β-D-2-gulcan, kernel protein and mean kernel size have been estimated in 6 cvs of oats (*Avena sativa* L.), and 8 wild *Avena* species grown at two levels on nitrogen fertility in a pot experiment. In the oat cvs, kernel protein and kernel β-glucan were both increased at the higher nitrogen fertility level. Comparison with the results from field grown material which had still higher kernel protein contents indicated that this association between β-glucan and protein occurred over a wide range of kernel protein levels. However cv differences were more distinct at lower fertility levels. Six of the eight *Avena* species had a mean kernel size that was subtantially lower than the cvs. However the protein contents of the *Avena* species were in general higher and they showed a wider range of β-glucan contents. Although higher nitrogen fertility increased grain protein in the wild species, β-glucan was only significantly increased in one species. Kernel β-glucan content was independent of both kernel protein and mean kernel size in the wild species. Results show that phenotypic variations in kernel protein are associated with concomitant variations in β-glucan in oat cvs and furthermore that wild *Avena* species may be useful additional sources of variation for this characteristic. AA

1434

Glenn (GM), Younce (FL) and Pitts (MJ). **Fundamental physical properties characterizing the hardness of wheat endosperm.** *Journal of Cereal Science* 13(2): 1991: 179-194

Wheat flour

1435

Crosbie (GB). **The relationship between starch swelling properties, paste viscosity and boiled noodle quality in wheat flours.** *Journal of Cereal Science* 13(2): 1991: 145-150

Selection of wheat breeding lines with improved quality for white, Japanese-style noodles is frequently deferred in Australian wheat breeding programmes until final stages of testing, due to the lack of suitable small-scale tests. In this study, the starch swelling power test was investigated, particularly for its suitability as a small-scale test for predicting noodle eating quality. In addition, two new tests based on the swelling volume of starch and flour are reported. For samples from 13 cvs at 2 sites, starch swelling power and starch swelling volume were significantly ($P < 0.001$) correlated with starch paste peak viscosity ($r = 0.80$, and $r = 0.81$ respectively). This suggests that these tests may provide similar information on the starch characteristics of these cvs. For starch separated from 13 flours had the previously been evaluated in Japan for noodle eating quality, starch swelling power and starch swelling volume were significantly ($P < 0.01$) correlated with total texture score of the boiled noodles ($r = 0.84$) and $r = 0.88$ respectively). Flour swelling volume was not as highly correlated as starch swelling volume with individual components of the texture score of the boiled noodles, but nevertheless variation in flour swelling volume accounted for 48% of the variation in total texture score. AA

MILLETS

Corn

1436

Bilgrami (KS), Rangjan (KS) and Masood (A). **Influence of the cropping pattern on aflatoxin contamination in preharvest kharif (monsoon) maize crop (*Zea mays*).** *Journal of the Science of Food and Agriculture* 58(1): 1992: 101-106

1437

Barney (RJ), Sedlacek (JD), Siddiqui (M) and Price (BD). **Quality of stored corn (maize) as influenced by *Sitophilus zeamais* Motsch. and several**

management practices. *Journal of Stored Products Research* 27(4): 1991: 225-237

The impact of several simulated management practices (malathion treatment, temp., moisture content, hybrid and surface disinfection) for *Sitophilus zeamais* Motsch. on the quality (biochemical composition) and germination of corn (maize) was studied. Quality was evaluated on the basis of protein, ash, lipid and total nonstructural carbohydrates content, wt. loss, and germination. When the abiotic conditions were favourable for *S. zeamais* oviposition, larval development, and progeny emergence, the ash, lipid and protein content of the kernels was increased, as was kernel wt. loss. Germination and dry matter were significantly decreased when progeny were present. The differences in nutritional parameters observed here were generally very small, although highly statistically significant. It is not clear whether these differences are biologically significant, although they indicate meaningful changes that may occur in corn nutrition and quality following infestation by *S. zeamais* for several generations. AA

Sorghum

1438

Pal (MS), Gupta (PC) and Singh (OP). **Grain yield, energy value and protein production in sorghum (*Sorghum bicolor*) - based intercropping system in foothills region of Uttar Pradesh.** *Indian Journal of Agricultural Sciences* 63(1): 1993: 38-40

Grain yield, energy value and protein production of sorghum var. CSH 9, CSH 6 as a main crop and inter crop in 13 combinations with pigeon pea, sunflower and soybean were studied. Sole crop of var. CSH 9 gave higher yield than var. CSH 6. Among the intercrops, sorghum (var. CSH 9) grown in 4:2 row combination gave higher grain yield than that grown in 3:3 row combination with pigeon pea, sunflower and soybean. Intercrops of pigeon pea, sunflower and soybean in different proportions with sorghum recorded 5 - 57%, 44 - 68% and 45 - 56% less grain yield respectively compared with their sole crops. Mean energy production in CSH 9 + pigeon pea (2:1) was 13, 130 Kcal/ha whereas that of CSH 9 + soybean (4:2) and CSH 9 + soybean (3:3) were 13,090 and 13,000 Kcal/ha respectively. Protein production was significantly highest in sole soybean crop followed by CSH 9 + soybean (3:3). Lowest protein production was in sole CSH 6 followed by CSH 9 sole crop. KAR

1439

Mugula (JK). **The nutritive quality of sorghum-commonbean tempe.** *Plant Foods for Human Nutrition* 42(3): 1992: 247-256

The nutritive quality of sorghum-commonbean (40:60) tempe manufactured by *Rhizopus oligosporus*: *Rhizopus oryzae* (1:1) mixed culture fermentation was determined. The protein, crude fat and ash content increased slightly, while carbohydrates decreased. The dietary fibre of the tempe increased by 10%. Mould fermentation increased the content of reducing sugars, total acid and amino-nitrogen 15.3, 6.7 and 4.6-fold, respectively. It decreased the phytate content by 44% and it increased the tannic acid content by 52%. *In vitro* iron absorption increased from 2.8 to 12.5%. The protein efficiency ratio of tempe was 1.61 plus or minus 0.33; the net protein ratio was 2.39 plus or minus 0.20; the *in vitro* and *in vivo* protein digestibility were 88.2 and 80.0 plus or minus 0.05% respectively, while the protein efficiency ratio, net protein ratio *in vivo* digestibility of skim milk was 2.96 plus or minus 0.17, 3.51 plus or minus 0.17 and 98.0 plus or minus 1.87, respectively. The sorghum-bean tempe could be used for supplementary feeding. AA

PULSES

1440

Kiran Kumari, Sinha (MM), Hameed (SF) and Mehto (DN). **Growth and development of *Callosobruchus chinensis* Linn. on various pulses on storage.** *Bulletin of Grain Technology* 29(3): 1991: 161-162

Growth and development of *Callosobruchus chinensis* Linn. on 5 pulses viz. chickpea (*Cicer arietinum*), pigeon pea (*Cajanus cajan*), green gram (*Vigna radiata*), black gram (*Vigna mungo*) and pea (*Pisum sativum*) stored at 22.3 plus or minus 4.10°C, RH 70.3% were studied. Growth index in gram, pea and urd were 1.89, 1.37 and 1.07 respectively. Arhar and moong grains unlike urd and pea were more suitable for the development of the pest. GS

1441

Elhardallou (SB). **The bile acids binding of the fibre-rich fractions of three starchy legumes.** *Plant Foods for Human Nutrition* 42(3): 1992: 207-218

The bile acid binding to undigestible fibre has a significance on bile acids excretion. This was known to result in lowering blood cholesterol (for the use of cholesterol in bile acid formation) as well as reducing the colorectal cancer risk (through decreased formation of secondary bile acids). Compared to the model fibres Solka floc and carboxymethylcellulose (CMC), the investigated fibre fractions of lentils, broad beans and butter beans, were found to bind

more cholic acid and chenodeoxycholic acid under conditions simulating the small intestine. AA

Cowpeas

1442

Woleson (JI), Shade (RE), Menezer (PE) and Murdock (LL). **Efficacy of ash for controlling infestations of *Callosobruchus maculatus* (F.) (Coleoptra: Bruchidae) in stored cowpeas.** *Journal of Stored Products Research* 27(4): 1991: 239-243

Storing cowpeas, *Vigna unguiculata* (L.) Walpers, with ash to protect them against *Callosobruchus maculatus* (F.) is a traditional storage method in northern Cameroon. The amount of ash used and the details of the methodology (i.e. mixing vs layering, the source of ash used) varies among farmers. In experiments designed to simulate traditional ash-storage procedures, it was found that a min. ratio of 3 parts of ash to 4 parts of cowpeas prevented population growth of *C. maculatus* and that a 3 cm layer of ash on top of stored seeds prevented infestation by adults. AA

Drybeans

1443

Heil (JR), McCarthy (MJ) and Ozilgen (M). **Magnetic resonance imaging and modeling of water up-take into drybeans.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 280-285

Magnetic resonance imaging and mathematical analysis showed that water up-take by undamaged dry beans occurs in 2 phases. The first phase appears to be controlled by natural barriers, i.e. the hilum/micropyle region and the seed coat. In this phase, water seems to dissolve the middle lamella, which bonds the seed coats to the cotyledons. The released seed coats are permeable to water. They are initially wrinkled, but become taut as the cotyledons are rehydrated and fully expanded. The second phase of the water up-take process starts after the seed coat attains the highest permeability. Water up-take rate appears to be constant during the first phase of soaking. In the second phase of the process water up-take slows down as water content approaches equilibrium. Water up-take rate by the washed beans with damaged seed coats was substantially higher than those of the undamaged beans. The damaged seed coats were usually lost when water up-take and swelling caused the skins to separate from the slower hydrating cotyledons. AA

Mungbeans

1444

Rosaiah (G), Santha Kumari (D), Satyanarayana (A), Rajarajeswari (V), Naidu (NV), Umaid Singh. **Cooking quality and nutritional characters of mungbean [*Vigna radiata* (L.) Wilczek] varieties.** *Journal of Food Science and Technology (India)* 30(3): 1993: 219-221

Cooking quality and nutritional characters of 9 genotypes of *mungbean* showed wide range of variations in the vol. and wt. of cooked seed and cooking time. Variations were lower for sp. gr., reducing sugars, initial seed wt. and vol. of seed. Amino acid analysis indicated considerable differences among the genotypes examined. In general, glutamic and aspartic acids were predominant, whereas cystine and methionine were present in low amounts. Among the genotypes, 'Pusa 105', 'Neelalu' and 'Patchapesalu' were observed to be better with respect to the cooking and nutritional traits as compared to other genotypes. AA

Peas

1445

Nilamani Das, Saini (SPS) and Bains (GS). **Effect of variety and maturity on canning characteristics of peas.** *Indian Food Packer* 47(1): 1993: 5-9

Three var. of peas, Pb-87, Pb-88 and Harabona-B were analysed at 2 maturity levels for their canning characteristics. Var. and stage of maturity had a great effect on pea composition. Moisture, soluble sugars and ascorbic acid (AA) decreased but acid insoluble sugar, fibre, starch, protein, chlorophyll and phytic P increased with maturity. Canning adversely affected the AA and chlorophyll. Peas from delayed maturity showing higher drained wt. and firmer texture than the others, was found better for canning. Late maturity canned Pb-87 var. of peas were the best among the three. GS

1446

Van Der Poel (AFB), Stolp (W) and Van Zuilichem (DJ). **Twin-screw extrusion of two pea varieties: Effects of temperature and moisture level on antinutritional factors and protein dispersibility.** *Journal of the Science of Food and Agriculture* 58(1): 1992: 83-87

Tests were conducted with 2 var. of pea (*Pisum sativum* L) to measure the effects of extrusion temp. (105-140°C) and moisture level (14-33%) on the level of antinutritional factors (ANF) and protein dispersibility. Twin-screw extrusion cooking of peas showed the dependence of proteinaceous ANF (trypsin inhibitors (TI) and lectins) on the processing variables used. In the round-seeded pea var.

(Finale), the moisture level as well as the temp. proved to be an important variable, although inactivation of TI activity was complete for all processing conditions. The temp. used during extrusion cooking largely inactivated ANF in wrinkle-seeded pea var. (C306). BV

OILSEEDS AND NUTS

1447

Narvaiz (P), Lescano (G) and Kairiyama (E). **Irradiation of almonds and cashew nuts.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 232-235

Almonds and cashewnuts were gamma irradiated with doses of 1.0, 1.5 and 2.0 kGy, and 1.0, 2.0, 3.0 and 4.0 kGy, respectively. Control and irradiated fruits were stored at 5 plus or minus 2°C for 6 months. Microbiological, chemical and sensory tests were performed to verify the effectiveness of these radiation doses and their effect on product quality. The initial mould and yeast load was reduced to acceptable values, which was then maintained throughout the storage time. Free fatty acids content and refractive index of the extracted oils were not altered by irradiation. Irradiation increased lipid peroxidation, but this was not noticed organoleptically. Greater amounts of total volatiles were found in irradiated samples, except in almonds, at the end of the storage period. No significant differences were found in the sensory quality of control and irradiated fruits at the beginning of the storage period. After 6 months, only a slight decrease in odour intensity was noticed in almonds irradiated with the higher doses (1.5 and 2.0 kGy). Although effects on insects were not studied, the applied radiation doses were high enough for disinfestation purposes. AA

Castor seeds

1448

Shashikala Puttaraj and Narendra Singh. **Dehulling of castor seeds.** *Journal of the Oil Technologists Association of India* 24(4): 1992: 149-151

Feasibility study for dehulling of castor seeds of a local var. and 'Aruna' hybrid var. showed that centrifugal sheller at 1800 r.p.m. could efficiently dehull castor seeds (90%) irrespective of seed size. Preconditioning treatments did not improve the efficiency further. Proximate composition of the kernels dehulled by hand or sheller were similar. The centrifugal sheller in commercial process of dehulling of castor seeds has the potential for higher yield of good quality oil. AA

Chestnuts

1449

Das (DK), Kumar (S), Singh (AK) and Prasad (US). **Sucrose mobilization in maturing seeds of water chestnut (*Trapa bispinosa* Robx.) and litchi (*Litchi chinensis* Sonn.).** *Journal of Food Science and Technology (India)* 30(3): 1993: 199-201

In water chestnut, the activities of sucrose synthetase and invertase run parallel during seed maturation with their high activities in immature seeds. On the other hand, in litchi, the activities of sucrose synthetase and invertase reveal almost a contrasting pattern during seed maturation. Nevertheless, rapid turnover in sucrose is indicated through the changes in the activities in these enzymes, which tend to differ in the 2 seeds. In water chestnut, invertase predominates over sucrose syunthetase, whereas in litchi cvs, sucrose synthetase predominates over invertase during seed maturation. AA

Gorgon nut

1450

Jha (SN) and Suresh Prasad. **Moisture diffusivity and thermal expansion of Gorgon nut.** *Journal of Food Science and Technology (India)* 30(3): 1993: 163-165

Moisture diffusivity (MD) of gorgon nut (*Eurylate ferox, Makhana* seed and its kernel, during roasting in an open pan at different moisture contents (MC) and pan temp. was determined. The coeff. of cubical thermal expansion (CTE) of the kernel and the shell at various moisture levels was determined by a dilatometer. MD of kernel and nut increased with increase in MC and temp. and have been correlated with the same. CTE of the shell and kernel increased with increase of MC. BV

Groundnuts

1451

Odeyami (OO). **Biochemical changes in the quality of decorticated groundnuts sold under tropical conditions.** *Bulletin of Grain Technology* 29(3): 1991: 152-157

Insect damage, microbial damage, moisture content and proximate composition were determined on decorticated groundnuts sold to consumers under tropical conditions. Significant changes in the lipid, free fatty acid and peroxide values were observed. GS

1452

Sukhumsuvum (S), Resurrecion (AVA) and Beuchat (LR). **Formulation and evaluation of sensory properties of a spread made from peanut tofu.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 302-308

Two peanut-based products envisioned to be consumed as spreads on bread were developed and evaluated for sensory quality. Aqueous extracts of peanuts were prepared from partially defatted peanut [flour:water, 1:9 (w/v), pH 8.0] at 80°C for 15 min. This process resulted in min. lipoxygenase activity and optimum protein extraction. Proteins in the extract were then coagulated by adding sulphate (0.3%) or cotric acid (pH 4.5) to produce peanut tofus which were used as base ingredients to develop chocolate and tangerine flavoured spreads, respectively. Sensory evaluation using non-Thai and Thai university students as panel members was done to aid in the formulation of highly acceptable chocolate and tangerine flavoured spreads. AA

Hazelnuts

1453

Kinderlerer (JL) and Johnson (S). **Rancidity in hazelnuts due to volatile aliphatic aldehydes.** *Journal of the Science of Food and Agriculture* 58(1): 1992: 89-93

Rancidity in hazelnut kernels was detected organoleptically, by GC/MS of the volatile off-flavour compounds and by reduction in both the total fatty acid content (g per 100 g oil) and iodine value (g per 100 g oil). An accumulation of volatile alkanals, 2-alkenals and alkanoic acids on storage of the kernels at ambient temp. in the presence of O_2 was noticed. Hexanal and octanal increased over tenfold on storage, while there was concomitant decrease in fatty acid content (83 g per 100 g oil) and iodine value (79) during the same period. BV

Soybeans

1454

Chhabra (NN). **The protein-rich wonder soyabean.** *Oils and Oilseeds Journal* 45(12): 1992: 11-15

Soybean, a source of high quality protein-lysine (43%) and oil content (20%) is comparable to animal proteins and milk in its nutritive value. It also contains all the 8 essential amino acids, 20% fat and edible oil content, 21% carbohydrates, 11.5% Fe and mineral salts like Ca and P and many important vitamins. Hence, it is suitable as a cereal supplement and low carbohydrate diabetic diet. GS

1455

Carter (JM), Lee (HA), Mills (ENC), Lambert (N), Chan (HW-S), Morgan (MRA). **Characterisation of polyclonal and monoclonal antibodies against glycinin (11S storage protein) from soya (*Glycine max*).** *Journal of the Science of Food and Agriculture* 58(1): 1992: 75-82

Polyclonal and monoclonal antibodies have been raised against the soya (*Glycine max* L.) 11S storage protein, glycinin. The characteristics of the antibodies have been studied using enzyme-linked immunoabsorbent assay (ELISA) and immunoblotting techniques. The polyclonal antibodies showed strong recognition of the storage proteins from pea, and smaller but significant interactions with storage proteins from other seeds. Two monoclonal antibodies were virtually completely soya specific, recognising different continuous epitopes from the acidic polypeptides believed to be present on the surface of the native protein. A third monoclonal showed a much wider specificity in the ELISA, including the recognition of certain storage proteins from other seed types to a greater extent than soya. The epitope for this antibody may have been present on the surface of the native protein and was discontinuous, dependent on spatial organisation for recognition. AA

1456

Savelkoul (FHMG), Boer (H), Tamminga (S), Schepers (AJ) and Elburg (L). **In vitro enzymatic hydrolysis of protein and protein pattern change of soya and faba beans during germination.** *Plant Foods for Human Nutrition* 42(3): 1992: 275-284

TUBERS AND VEGETABLES

Beetroots

1457

Sidhu (P), Sital (JS), Bhatia (MS), Narang (RS) and Narang (AS). **Effect of some newly formulated organic compounds on the yield, mineral composition and sugar quality of *Beta vulgaris* L.** *Indian Sugar* 42(12): 1993: 931-939

Effect of seed treatment by soaking sugarbeet var. Ramonskaya-06, for 16 h at room temp. with newly synthesized compounds N-[4(2,3 dimethyl-1-phenyl-3-pyrazolen-5-one)] yl-2-methoxybenzamide (C-1), N-[4(2,3 dimethyl-1-phenyl-3-pyrazolen-5-one)] yl-phenyl acetamide (C-11), N-[4(2,3 dimethyl-1-phenyl-3-pyrazolen-5-one)]yl-2,4-dichlorophenoxy

acetamide (C-111), N-[4(2,3 dimethyl-1-phenyl-3-pyrazolen-5-one)] yl-4-nitrophenyl acetamide (C-IV), at 40, 80 mg/g (40 and 80 p.p.m.) were evaluated for their influence on plant growth, beet root yield, mineral composition and ultimately sucrose sugar synthesis, applied during bulking stage, (100 to 156 days after sowing). Results showed that, all these chemicals are metabolically active, C-II (40 p.p.m.), C-III (40 p.p.m.) and C-IV (40 and 80 p.p.m.) increased sucrose content, root and gross sugar yields and sustained a favourable Na^+/K^+ and Na^+/Ca^{2+} or $Na^+/Ca^{2+} + Mg^{2+}$ balance during the bulking phase. SRA

Carrots

1458

Walde (SG), Math (RG), Chakkaravarthi (A) and Rao (DG). **Preservation of carrots (*Daucus carota* L.) by dehydration techniques - a review.** *Indian Food Packer* 46(6): 1992: 37-42

Carrot rich in carotene, vitamins and minerals is widely used for the preparation of juice, powder, flakes and sweetmeats like *halwa* and *muraba*. The paper reviews different dehydration techniques like hot-air cabinet drying, solar drying, freeze drying and fluidized-bed drying for the preservation and off season use of carrots. 24 references. GS

Cassava

1459

Noomhorm (A), Ilangantileke (S) and Bautista (MB). **Factors in the protein enrichment of cassava by solid state fermentation.** *Journal of the Science of Food and Agriculture* 58(1): 1992: 117-123

The enrichment of cassava protein content using solid substrate fermentation was studied on both lab. and on-farm scales using *Aspergillus niger* as a starter. The effects of cassava particle size and of various nitrogen source ratios and mixing methods were investigated. Ammonium sulphate and urea as sources at respective levels of addition (g N kg^{-1} substrate) of 10:10, 20:10 and 20:20 were used in combination with cassava alone and cassava mixed with rice bran and soyabean each having mixing levels of 50, 100 and 150 g kg^{-1}. The mixture was fermented for 84 h at 35°C and 90-95% RH on the lab. scale and 29-31°C and 95-99% RH at the on-farm scale. The results indicated that cube sizes ranging from 0.3 to 0.5 cm^3 gave good mycelial growth. Pure cassava alone at the 10:10 nitrogen addition level produced the highest protien yield of about 145 g kg^{-1}. The on-farm technique yielded higher protien enrichment compared with lab. experiments. Cassava alone yielded 230 g kg^{-1} protien while cassava with rice bran and cassava with soya bean each produced 210 g kg^{-1} protien. AA

1460

Firman (A). **Chemical changes in cassava tubers (*Manihot esculenta* Crantz) during production of placali.** *Tropical Science* 32(4): 1992: 353-360 ( )

A method for preparing fermented cassava flakes was developed. These cassava derivatives were dehydrated forms of placali, which is very perishable due to its high water content. Steps in the processing of flakes and traditional placali included peeling, cutting, washing, grinding, fermenting, drum-drying, milling, sieving and boiling. During processing, chemical constituents of tubers were significantly affected but, in organoleptic tests, these fermented cassava flakes performed as well as, or better than, traditional placali. AA

Leafy vegetables

Amaranthus

1461

Dhan Prakash and Pal (M). **Seed protein, fat and fatty acid profile of *Amaranthus* species.** *Journal of the Science of Food and Agriculture* 58(1): 1992: 145-147

The protein, fat and fatty acid composition in the seeds of 41 lines of amaranth *Amaranthus* spp including both the grain and vegetable types were analysed. Protein varied from 103 to 183 g kg^{-1} and fat from 8 to 68 g kg^{-1}. Hexadecanoic, octadecenoic and octadecadienoic acids were the major fatty acids of the oil. AA

Okra

1462

Jagannohan Rao (S), Azeemoddin (G), Atchyuta Ramayya (D) and Thirumala Rao (SD). **Processing of Indian okra seed.** *Journal of the Oil Technologists Association of India* 24(4): 1992: 137, 139-140

Discarded okra (*Hibiscus esculentus*) seeds were processed and the recovered oil was refined. Its characteristics were comparable to those of okra seed oil. The extracted meal was rich in protein content (42%) and several essential amino acids. Snacks like potato chips and *bajjis* prepared using the oil were tasty and acceptable. GS

1463

Subbaiah (K), Sundararajan (S) and Muthuswami (S). **Mode of potassium application on the N, P, K, Ca and Mg contents of bhendi fruits.** *Madras Agricultural Journal* 79(4): 1992; 226-227

Split soil/foliar application of potassium in the form of muriate of potash to bhendi (okra, *Hibiscus esculentus*) crops had little effect on the N, P and K contents of bhendi fruit and had antagonistic effect on its Ca and Mg content. GS

Pumpkins

1464

Lazos (ES). **Certain functional properties of defatted pumpkin seed flour.** *Plant Foods for Human Nutrition* 42(3): 1992; 257-273

Defatted pumpkin (*Cucurbita pepo* and *C. maxima*) seed flour has potential food uses because of its high protein content, 61.4 plus or minus 2.56%. The functional and electrophoretic properties of the defatted flour were investigated. Polyacrylamide gel electrophoresis and electrofocusing indicated 14 bands of water-soluble protein subunits with isoelectric points between 3.81-8.08 and apparent mol. wts. between 19,200 and 97,000 daltons. Min. nitrogen solubility was observed at pH values between 3.0-7.0 and exceeded 90% at pH above 9.0. Solubility was a function of ionic strength. It appeared that, even at the pH of min. solubility, the pumpkin seed proteins could be dissolved up to high concn. by increasing NaCl molarity. The viscosity of flour-water dispersion was affected by flour and salt concn., and temp. The least gelation concn. was 8% (w/v) and the water and oil absorption 24.8 plus or minus 2.03 and 84.4 plus or minus 4.05 g/100 g respectively. Sorption isotherms, BET monolayer moisture and binding energy of sorption were also calculated. Both foam capacity and stability were pH dependent. AA

Snakegourds

1465

Vijayakumar (A), Jayaraj (T) and Irulappan (I). **Effects of fertilizer and spacing on seed yield and quality in snakegourd cv. PKM.1.** *Madras Agricultural Journal* 79(4): 1992; 205-208

An experiment was conducted to find out optimum fertilizer and spacing requirements for the seed crop of snakegourd (*Trichosanthes anguina*) cv. PKM.1. The 3 fertilizer treatments were: 6:12:6, 9:15:9 and 12:24:12 g of the NPK/pit and three spacings were 2 x 2.5 m, 3 x 1 m and 4 x 0.6 m. The results revealed that application of 12:24:12 g. of NPK/pit and sowing at a spacing of 2 x 2.5 m were optimum for getting higher seed yield (119.87 g/pl). The treatments also recorded high recovery of large size seeds (61.5%), high 100-seed wt. (32.095 g), germination (98%), root length (18.6 cm), shot length (39.6 cm) and vigour index (5692). AA

Tomatoes

1466

Whitaker (BD). **Lipid changes in microsomes and crude plastid fractions during storage of tomato fruits at chilling and nonchilling temperatures.** *Phytochemistry* 32(2): 1003; 265-271

Mature-green tomato fruits (*Lycopersicon esculentum* were stored for 4 or 12 days at chilling (2° or nonchilling (15°) temp. Fruits stored for 12 days at 15° ripened to the turning stage, whereas fruits at 2° did not ripen. Lipids of plastid and microsomal membrane fractions from pericarp tissue were analysed at harvest and after 4 or 12 days of storage. After 12 days at either 15° or 2°, the ratio of phospholipids (PL) to protein in microsomes declined, with a concomitant increase in the ratios of total membrane sterols (TMS) and cerebrosides (CB) to PL. The TMS:PL and CB:PL ratios also increased in crude plastid fractions. In both microsomes and plastids, free sterols (FS) increased more at 2°) than at 15°, and hence accounted for a larger percentage of the TMS (FS + acylated steryl glycosides + steryl glycosides). The ratio of stimgasterol to sitosterol in all steryl lipids, but particularly in FS, increased more than 15° than at 2°. The unsaturation index of fatty acids in PL and galactolipids generally increased slightly during storage at both 15° and 2°. The ratio of phosphatidylethanolamine to phosphatidylcholine increased in both membrane fractions at both temp. In plastids, the ratio of mono- to diagalactosyldiacylglycerols declined substantially at 2° but not at 15°. AA

FRUITS

1467

Radhakrishnaiah Setty (G), Vijayalakshmi (MR) and Usha Devi (A). **Methods for peeling fruits and vegetables: A critical evaluation.** *Journal of Food Science and Technology (India)* 30(3): 1993; 155-162

Various methods and machinery used for peeling fruits and vegetables, along with latest developments, are critically discussed in this review article. Advantages of each system are cited to allow the assessment of the overall effect of using a particular system in a given processing situation. The effect of peeling on the colour, appearance and

composition of peeled material is also discussed. 45 references. AA

1468

Shah (GH) and Bains (GS). **Storage studies on canned peach and apricot pulps.** *Indian Food Packer* 46(6): 1992: 15-18

Peach (*Prunus armeniaca* L.) and apricot (*Prunus persica*) pulps preparation techniques were standardized and the storage behaviour of canned pulps was studied. Boiling lye sol. of 1.5% concn. was found suitable for peeling peaches but was injurious for apricots. Apricots and peaches require 3 - 4 and 4 - 5 min respectively for blanching at 92.5 plus or minus 2.5°C. Canned peach and apricot pulps stored well over 24 wk. Changes in TSS, acidity, pH and pectin were negligible. During storage the polyphenols, β-carotene and colour (TU) decreased. GS

Aonla

1469

Sanjeev Kumar and Nath (V). **Storage stability of *Aonla* fruits - A comparative study of zero-energy cool chamber *versus* room temperature.** *Journal of Food Science and Technology (India)* 30(3): 1993: 202-203

Physiological loss in wt., decay and loss of vitamin C content were considerably less in fruits stored under zero-energy cool chamber as compared to those stored at room temp. Under zero-energy cool chamber, the fruits of 'Chakaiya' cv. can be stored upto 12 days with acceptable min. decay and quality loss, as against 4 days at room temp. AA

Apricots

1470

Singh (RP), Gupta (AK), Harbans Singh and Bhatia (AK). **Suitability of apricot cultivars grown in Ladakh for canning.** *Indian Food Packer* 46(6): 1992: 31-35

Ten cvs. of apricot (*Prunus armeniaca* L.) grown in Ladakh region of Jammu and Kashmir, India, were analysed for their suitability for canning in syrup. The order of preference was Halman, Shekarpara, Sufaidi, Nari, Rakchay-karpo and Tokpopa since their canned products showed better texture, flavour, colour and clarity of syrup. GS

Figs

1471

Icibal (N) and Altug (T). **Degradation of aflatoxins in dried figs by sulphur dioxide alone and in combination with heat, ultraviolet energy and hydrogen peroxide.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 294-296

Aflatoxin degradation potential of SO_2 gas alone or in combination with heat, UV energy and hydrogen peroxide, on dried fig fruits spiked to contain 100 p.p.b. of total aflatoxin (B_1, B_2, G_1, G_2) was investigated. The treatment using 2000 p.p.m. SO_2 gas plus 65°C heat plus 0.2% hydrogen peroxide sol. was the most effective procedure by which 95% degradation was detected in total aflatoxin content. AA

Guavas

1472

Sagar (VR) and Maini (SB). **Economic utilization of rainy season guava drying aspects.** *Indian Food Packer* 46(6): 1992: 19-22

Rainy season guava (inferior in quality to the winter season guava) was sundried in the form of leather after preparing pulp for economic utilisation. Dried guava pulp was obtained in 21 h at an ambient temp. of 33 - 38°C when dried at a tray load of 2 kg/sq meter. The optimum SO_2 treatment to pulp for storage was 750 p.p.m. The product was acceptable upto 9 months when stored in 200 g polythene bags at 17 - 34°C. GS

1473

Madhavi (DL), Nagin C. and, Rajalakshmi (D) and Patwardhan (MV). **Effects of growth hormones and maturity of the fruits on the Callus culture of guava (*Psidium guajava*) fruits using response surface methodology.** *Journal of the Science of Food and Agriculture* 58(1): 1992: 29-34

Guava, a tropical fruit, is valued for its aroma and is used in many fruit products. Earlier work from the lab. has shown that the expression of the flavour as a secondary metabolite through tissue culture *in vitro* is possible. In the present study an attempt has been made to maximise the callus culture growth through optimisation of the hormonal combinations of indole acetic acid (IAA), 2,4-dichlorophenoxy acetic acid (2,4D) and kinetin (Kn). The effect of using fruits of different maturity was also assessed. The study of the complex interactions of the growth hormones and the identifications of the optimal hormonal levels have been carried out using appropriate design of experiments which are specially framed for such purposes. Simplex optimisation techniques were used to obtain the optimum levels of these hormones for highest relative growth in the experimental

region. The results indicate that callus culturing with fruits before reaching climacteric with MS medium supplemented with 0.01 mg l^{-1} of IAA and 2.4D and 2.87 mg l^{-1} of Kn results in a high relative growth of 8.97 for the callus. AA

Mangoes

1474

Singh (BK) and Singh (TP). **Effect of certain post-harvest treatments on the storage life and quality of mango cv. Zardalu.** *Indian Food Packer* 46(6): 1992: 57-64

Mango (*Mangifera Indica* L.) fruits *Zardalu* cv was subjected to 11 different treatments, hot water/GA_3/Captan/wrappings and stored at room temp. and analysed for physiological loss in wt. %, spoilage %, economic life, total soluble solids (°Brix) (TSS), titrable acidity %, ascorbic acid (mg/100 g) and total sugar % to determine shelf-life. Captan (2000 p.p.m.) treatment with subsequent newspaper wrapping increased the shelf-life of fruits for 4 days. GA_3 (50 p.p.m.) treatment with perforated polythene wrapping proved to be the best upto a period of 13th day for (i) min. loss in fruit wt. (ii) slower increase in TSS, sugar content retaining more acidity and ascorbic acid content (iii) max. conversion of starch and polysaccharides to total sugar (iv) sensory quality and (v) 3 - 4 days extended economic storage life. SD

Oranges

1475

Bhalerao (SD) and Mulmuley (GV). **Studies of bitterness in orange cultivars.** *Indian Food Packer* 46(6): 1992: 23-29

Physico-chemical and sensory characteristics of 13 cv. of oranges, particularly for development of bitterness in juice were studied. Juice from Clementine and Honey cv. were non-bitter, due to low limonin content being below threshold value. Nagpur orange juice which develops delayed bitterness blended in the ratio of 1:1 with non-bitter juice from Clementine and Honey cvs yielded acceptable level of bitterness. GS

CONFECTIONERY, STARCH AND SUGAR

Sugars

1476

Vitolo (M) and Barros (DP). **Sucrose hydrolysis by invertase immobilized on chitin.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 240-243

Invertase (E.C.3.2.1.26) was immobilized on krill chitin previously treated with 6 M HCl, 7 M KOH, in the presence of glutaraldehyde (lgl^{-1}). The activity and stability against pH (from 3.8 - 7.0) and temp. (from 30 - 65°C) as well as the kinetic parameters (K_M and V_{max}) were determined for soluble and insoluble invertase. It was verified that : (1) immobilization did not enhance the thermostability of the enzyme; (2) chitin - invertase complex and soluble invertase had activation energies of 31.08 kJ mol^{-1} and 29.30 kJ mol^{-1}, respectively; (3) soluble invertase showed max. activity at pH 5.0 whereas the immobilized form exhibited max. activity at pH 4.0; (4) K_M and V_{max} values were 52.2 mM and 1.20 U mg^{-1} protein and 39.0 mM and 2.73 U mg^{-1} protein for insoluble and soluble invertase, respectively. AA

Sugarcanes

1477

Saini (JP) and Chakor (IS). **Effect of irrigations and weed management.** *Indian Sugar* 42(11): 1993: 843-847

Four combinations i.e. 2 var. of sugarcane (COJ-64 and CO-1148) and 2 moisture levels (unirrigated and irrigated) in main plots and 5 weed management treatments (weedycheck, weedfree, atrazine, 1.5, 2.0 and 2.5 kg ha^{-1}) in subplots were studied in split pilot design with 3 replications for 2 yr, 1984-85 and 1985-86 at the experimental farm of HPKV, Palampur (Kangra). Var. COJ-64 was significantly superior to CO-1148 in recording sucrose %, purity coeff. and % available sugar, however, extraction % and commercial cane sugar were higher in CO-1148. When irrigated, the crop gave significantly higher commercial cane sugar and extraction % over unirrigated plots but other quality parameters were not affected significantly. In general all the quality parameters were inferior in weedy plots as compared to the weed free treatment. Commercial cane sugar was about 68.65% and 86.80% higher in weedfree as compared to weedcheck treatment during 1984-85 and 1985-86 respectively. AA

1478

Rais Ahmad and Khan (AQ). **A new empirical formula for estimation of sugar recovery in sugarcane.** *Indian Sugar* 42(11): 1993: 849-853

Fourteen sugarcane var. which differed in fibre % from 12 (Co. Pant 84212) to 20% (Co. S 8118) were investigated, adopting the new formula, sugar recovery % cane = [S-(B-S)0.327 F^1 where S = sucrose % juice, B = Brix % juice, 0.32 is the constant derived from lowest exhaust molasses

purity in unit (0.2425) as 0.2425/1 - 0.2425. It represents the fraction of non-sucrose soluble solids causing loss to sucrose crystal sugar formation. $F^1 = 2\ E - E^2/0.84$. F^1 is the factor which represents max. available juice per unit cane. E is the extracted juiceper unit cane. This formula would be of much practical value for researchers as well as sugar mills, since it estimates sugar recovery in sugar cane var. with small cane sample. SRA

1479

Sen (A). **Effect of late and early spraying of boron and manganese on yield and juice quality of sugarcane grown in calcareous soil.** *Indian Sugar* 42(11): 1993: 855-856

Late spraying (July - September, 1987-89) and early spraying (April - June, 1989-91) of 0.25% sol. of boric acid and manganese sulphate (alone and in combination) were conducted for 4 consecutive yr in the calcareous soil where early, mid-early and late maturing var. of sugarcane were grown. Foliar applications of Mn alone and B+Mn done between April and June gave significant increase in yield over the check indicating its efficacy in early spraying as well. SRA

1480

Jaipal (S), Dandsay (JP) and Dharam Singh. **Effect of *Pyrilla perpusilla* infestation on sugar recovery in sugarcane.** *Indian Sugar* 42(12): 1993: 917-924

Extent of losses in sugar recovery caused by *P. perpusilla* at various infestation levels in the autumn plantation and ratoons of sugar cane var. Co 7717, CoJ 64, CoS 767 and Co 1148 was assessed from the command areas of 3 sugar mills in Haryana, India. All the var. suffered losses in sugar recovery, proportionate to the degree of infestation. Significant negative correlation coeff. were observed between various population levels and the quality traits (Brix, sucrose, purity and sugar %). Losses were high in the autumn planted cane of Co 7717 in the early maturity phase. Ratoons of commonly cultivated var. suffered recovery losses even at the time of harvest. SRA

1481

Haidar (MG), Samad (MA) and Waris (ML). **Efficacy of organic soil amendments and carbofuran on plant parasitic nematodes, yield and juice quality of sugarcane.** *Indian Sugar* 42(12): 1993: 925-929

Effect of application of castor (*Ricinus communis* L.), *Pongamia glabra* L., mustard (*Brassica campestris* L.), Azadirachta cakes, pressmud and carbofuran in soil was examined on nematode population, yield and juice quality of sugarcane. Nematode population, prior to treatment comprised lance (*Hoplolaimus indicus*), stunt (*Tylenchorhychus nudus, T. goldeni*), spiral (*Helicotylenchus dihystera, H. indicus*), lesion (*Pratylenchus zeae*), pin (*Paratylenchus* sp. Hemicroconemoides) and larvae of root-knot (*Meloidogyne* sp.), cyst (*Heterodera* sp.) and reniformis (*Rotylenchulus reniformis*). Of these, stunt, lance, spiral and lesion nematodes dominated. Av. population varied from 8809 to 10161/500 g soil. All the treatments were effective in reducing nematode population significantly over untreated check after 45 days of treatment. Max reduction was due to carbofuran (67.2%). Of the organic amendment, mustard cake was found to be the best followed by neem cake, pressmud compost, castor cake and karanj cake. SRA

BAKERY PRODUCTS

1482

Bhaskara Rao (R). **Problems and prospects of bakery industry.** *Indian Miller* 23(5): 1993: 10-13

General problems and constraints facing the bakery industry are briefly described and recommendations to overcome them are also given. SRA

1483

Patel (MM). **Quality testing of raw materials for baked products.** *Indian Miller* 23(5): 1993: 17-20

A typical quality assurance programme consists of setting standard for raw materials, preproduction quality evaluation of raw materials, process quality planning, sanitation, planning, process and product evaluation, and post-production services. Significance of moisture, ash, protein, gluten, sedimentation test, alcoholic acidity, maltose value, Hagberg's falling number, colour, baking test are briefly covered, and specifications of flours for bread, biscuit and cake are given. SRA

1484

Janovsky (C). **Encapsulated ingredients for the baking industry.** *Cereal Foods World* 38(2): 1993: 85-87

An overview of the common methods (spray drying and fluidized bed coating) and materials used to produce encapsulated bakery ingredients and the commercial applications of these products (encapsulated sodium bicarbonate, encapsulated acidulants, encapsulated preservatives, encapsulated dough conditioners, encapsulated vitamins and minerals) is presented in this article. CSA

1485

Mclsaac (), Potter (SM) and Weigel (MM). **Effect of consumer education on the purchase of soy-containing bakery items.** *Cereal Foods World* 38(3): 1993: 154-156

Biscuits

1486

Leelavathi (K) and Haridas Rao (P). **Development of high fibre biscuits using wheat bran.** *Journal of Food Science and Technology (India)* 30(3): 1993: 187-190

Studies on development of high fibre soft biscuits indicated that flour could be substituted with raw wheat bran upto 30% level, as a source of dietary fibre, without affecting the overall quality. Min. levels of fat and sugar required in the formulation were 15 and 26%, respectively. Incorporation of 0.5% sodium stearoyl lactylate improved the quality of biscuits. The dietary fibre content of these biscuits was about 7 times higher than the control biscuits. High fibre biscuits wrapped in 100 guage polypropylene pouches had a shelf-life of about 90 days when stored at 27 plus or minus 2°C and 60 plus or minus 2% RH. AA

Bread

1487

Gurmukh Singh and Sinha (LK). **Firmness and sensory characteristics of breads containing defatted soy flour.** *Bulletin of Grain Technology* 29(3): 1991: 158-160

Crust colour, break and shread, symmetry, grain, crumb colour and texture of bread loaves (prepared by wheat flour, wheat alone and soy flour blend at 3-18% level) were evaluated. The water absorption increased gradually with increasing levels of defatted soy flour in the blends. Bread loaves become more compact as the level of soy flour in the blends was increased. Firmness of bread was higher when soy flour was added at 3% but at 6% and higher levels, firmness and sensory characteristics were adversely affected. GS

1488

Haridas Rao (P). **Flour improvers and additives in bread.** *Indian Miller* 23(5): 1993: 29-33

Quality of Indian wheat, additives, flour improvers (bleaching agent, maturing agent), method of treatment (types of additives in bread, yeast foods, water conditioners), fermentation aids (emulsifiers), surfactants and antimicrobial agents are reviewed. SRA

1489

Berglund (PT) and Shelton (DR). **Effect of frozen storage duration on firming properties of breads baked from frozen doughs.** *Cereal Foods World* 38(2): 1993: 89-90, 92, 93

Frozen bread doughs in 3 separate studies were prepared using a no-time dough formula. 2 studies (I and III) used commercial flours supplemented with wheat gluten, and a third study (II) used flour from 5 hard red spring wheat varieties milled on a 55-cwt pilot Miag mill. Breads were baked from frozen doughs after one day and 4, 8, 12, 16, and 20 wks of frozen storage. The Instron Universal Testing Machine was used to measure crumb firmness of the breads 4 h, one day and 4 days after baking. Moisture contents of the breads in study III were determined. For all studies, bread crumb firmness increased with increased storage time after baking. Longer frozen dough storage yielded firmer bread. The length of storage time after baking did not significantly affect crumb moisture contents, which ranged from 45.18 to 48.29%. Crumb moisture contents were higher for breads baked from dough frozen for longer storage times and lower for breads baked from dough frozen for shorter durations. Some of the variation in increased bread firmness appeared to be associated with the decreased loaf volumes of breads baked from frozen doughs. AA

1490

Larsen (NG) and Greenwood (DR). **Water addition and the physical properties of mechanical dough development doughs and breads.** *Journal of Cereal Science* 13(2): 1991: 195-205

The effects of water addition on the physical properties of mechanical dough development doughs and breads have been examined. Dough mixing times at constant work input increased with more added water. Optimum water absorption, as measured by mixing curve dough consistency, did not necessarily result in the best baking quality. Increasing water addition above the optimum was likely to be detrimental to crumb grain, but the effects on loaf volume and bake score were not consistent. Indeed, good quality bread could still be obtained, with high water addition. However, dough handling with inappropriate machinery would limit the extent to which water can be added in a bakery. Differences of about 8% were seen between crumb moisture at the centre and edges of loaves. In addition to affecting physical measurements on bread, it is postulated that the moisture differential would affect the activity of heat stable anti-staling enzymes. The moisture contents of crumb in the centre of both lidded and unlidded commercial size loaves were equal at a given level of added water, and can be accurately predicted and controlled. AA

Dough

1491
Wang (GIJ), Faubion (JM) and Hoseney (RC). **Studies of the breakdown and reformation of SDS insoluble glutenin proteins with dough mixing and resting.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 228-231

The high mol. wt. glutenin fraction of flour, which was originally insoluble in 1.5% SDS (sodium dodecyl sulphate), formed a gel-like layer after centrifugation at 80,000 g for 30 min. The layer became soluble in SDS after dough mixing but insoluble again in SDS sol. when the dough was rested after mixing. Both the gel-layer's viscosity and the amount of protein extracted in the supernatant increased as a result of mixing, and decreased when the dough was allowed to rest for 2 h before extraction. Results indicate that the gluten protein was converted to a less complex and more soluble system during mixing. During resting, the protein again became complex but only part of its solubility was lost. In the presence of 2% β-mercaptoethanol, both the viscosity and the amount of protein in the supernatant plus gel protein from flour, mixed dough, and mixed and rested dough were essentially the same. This indicated that breaking and reforming of disulphide bonds played a key role in the breakdown and reformation of the gel protein. Studies utilizing a gluten plus starch model system indicated that the difference in mixing tolerance and width of the mixogram tail cannot be explained by depolymerization of gluten proteins. AA

1492
Kerr (CL), Faubion (JM) and Hoseney (RC). **Effects of lipoxygenase and yeast on the rheological properties of dough.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 244-247

The spread test was used to assess the effects of lipoxygenase on the rheological properties of fermenting doughs. Lipoxygenase and yeast had similar effects on the rheological properties of dough but appeared to act through different mechanisms. Lipoxygenase had its effect during mixing and required the full mixing time to be fully effective. Yeast's rheological effect occurred during fermentation time and could be stopped by free radical scavenging antioxidants. Flour water solubles were required for yeast to have its effect. Fractionation - reconstitution studies suggested that yeast produces its oxidizing effect on dough by acting on low mol. wt. thiols in the water soluble fraction of flour. The rheological effect of air on dough was shown not to be occurring via lipoxygenase. AA

MILK AND DAIRY PRODUCTS

Milk

1493
Patel (BR), Patel (RM) and Patel (KC). **Effect of feed on characteristics of cow milk fat.** *Journal of the Oil Technologists Association of India* 34(3): 1992: 93-94

Kankrej cows 3 in each group were fed for 10 wks with (i) conc. mixture (10.2%) C.P.) (A), (ii) feed (A) + thyroprotein, (iii) conc. mixture (21.7% C.P.) (B) and (iv) feed (B) + tyroprotein. Iodine value, R.M. value and P. value did not differ in fresh ghee isolated from milk of the 4 groups of cows but showed slight difference when stored for 1 yr at 15°C. SD

1494
Ram (M) and Joshi (VK). **Studies on some components of proteose - peptone fraction from buffalo milk - Part II. Some physico-chemical characteristics.** *Indian Journal of Dairy Science* 45(4): 1992: 194-198

Mol. wts. of proteose-peptone (PP) components -3, -5 and -8 of raw buffalo milk were 25,200, 23,200 and 20,180 respectively. Amino acid make-up was found to be similar to the cow milk PP components. Arginine was the N-terminal amino acid. Percentage of sialic acid, hexose, hexosamine and P concn. of P-P components -3, -5 and -8 were 1.65, 0.33 and 0.22; 1.53, 0.31 and 0.21, 2.58, 0.53 and 0.34, 0.19, 1.45 and 2.64 respectively. BV

1495
Farrag (SA) and Marth (EH). ***Escherichia coli* 0157:H7, *Yersinia enterocolitica* and their control in milk by the lactoperoxidase system : A review.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 201-211

This review discussed aspects such as enterohemorrhagic *E. coli* 0157:H7 and *Y. enterocolitica* (history, growth requirements and biochemical characteristics, disease characteristics and outbreaks) and lactoperoxidase system (LPS) (lactoperoxidase, hydrogen peroxide, thiocyanate, lactoperoxidase activity against pathogenic and spoilage microorganisms, mechanism of antibacterial activity by the LPS and safety of the LPS). 253 references. BV

1496

Adhikari (AK) and Singhal (OP). **Effect of dissolved oxygen content on the flavour profile of UHT milk during storage.** *Australian Journal of Dairy Technology* 47(1): 1992: 1-6

Pasteurised (HTST) milk subjected to UHT treatment (indirectly heated) at 140°C/3 sec followed by aseptic packaging in tetrahedron poly pak cartons having sufficient head space (not degassed), was stored at 22 and 37°C up to 33 days (until spoilage). The availability of sufficient dissolved oxygen and the presence of air in the head space caused a rapid oxidation of free sulphydryl compounds reducing the intensity of cooked flavour significantly within 12-13 days at both temp. but gradually intensifying the oxidised flavour from 13 days onwards at 22°C. However, the intensity of oxidised flavour due to autoxidation of fat to carbonyl compounds was more pronounced after 22-23 days storage at 37°C leading to its early spoilage. In general, the deterioration of flavour and taste of UHT milk was faster at 37°C than at 22°C. The dissolved oxygen content was significantly correlated ($P < 0.01$) with the flavour score. AA

1497

Lehmann (FL), Russell (PS), Solomon (LS) and Murphy (KD). **Bacterial growth during continuous milk pasteurisation.** *Australian Journal of Dairy Technology* 47(1): 1992: 28-32

Bacteriological aspects of continuous operation of commercial cheesemilk pasteurisers for extended times of up to 21 h were investigated. Total bacterial numbers in pasteurised milk increased slightly over the initial 8-9 h, then more rapidly, sometimes exponentially, over the remaining period of operation, reaching in excess of one million per mL and exceeding total bacterial numbers in the raw milk. The increase in total bacteria per mL of pasteurised milk was not observed in samples from the holding tube but was seen in samples from the cooling side of the regenerative section, suggesting bacterial growth on plate walls of the regenerative section which seeded the pasteurised milk. Bacterial numbers in pasteurised milk were influenced by raw milk bacterial quality, which was in turn influenced by temp. and flow characteristics of raw milk in pre-pasteurisation balance tanks. A 20 min caustic miniwash of pasteurisers after 10 h continuous operation was shown to reduce bacterial numbers in pasteurised milk and is a recommended procedure to control bacteria buildup in commercial pasteurisers and contamination of pasteurised milk during prolonged operation. AA

1498

Singh (H), Sharma (R) and Tokley (RP). **Influence of incorporation of soya lecithin into skim milk powder on the heat stability of recombined evaporated milk.** *Australian Journal of Dairy Technology* 47(1): 1992: 33-37

The effects of incorporation of soya lecithin into skim milk powder on the heat stability of recombined evaporated milk (REM) were investigated on 6 occasions during the dairying season. Soya lecithin was either added to skim milk prior to preheating or added to the concentrate before drying. In some cases, lecithin was added to the control skim milk powders at the recombining stage. Incorporation of lecithin markedly increased the heat stability of REM, irrespective of the time in the season. The extent of stabilisation was dependent on the order in which lecithin was added to the powders. Lecithin addition had no effect on the heat stability of reconstituted concentrated skim milks. Lecithin addition had little effect on the amount of protein adsorbed at the fat-serum interface during homogenisation, suggesting that stabilising action of lecithin does not simply involve the displacement of protein from the fat-serum interface. AA

1499

Craven (HM) and Macauley (BJ). **Microorganisms in pasteurised milk after refrigerated storage. 1. Identification of types.** *Australian Journal of Dairy Technology* 47(1): 1992: 38-45

Pasteurised milk from 3 Melbourne manufacturers was tested every fortnight for 15 months to identify the microorganisms responsible for spoilage. *Pseudomonas* sp. were the most commonly isolated types (86.8 and 83.0%) of isolates after the milk was stored at 4 or 7°C respectively). Other microorganisms isolated after storage at 4 and 7°C were respectively. Gram-postitve bacteria (5.5 and 10.1%), yeasts (4.3 and 0.7%), *Flavobacterium* (1.8 and 0.8%), Enterobacteriaceae (1.2 and 1.4%), *Alcaligenes* (0.4 and 1.3%), *Acinetobacter* (0 and 2.6%), and *Aeromonas* (0 and < 0.1%). Samples containing predominantly *Pseudomonas* sp. after storage had a shorter shelf-life than samples with Gram-negative bacteria which in turn had a shorter shelf-life than samples with Gram-positive bacteria or yeasts. The difference in shelf-life between samples with *Pseudomonas* and other types of microorganisms was more pronounced when milk was stored at 4 than 7°C. Lipolytic and proteolytic activity tests on pseudomonads isolated in the first three months of the study revealed considerable variation in response within species and biovars. Given that pseudomonads are post-pasteurisation contaminants, the results suggest that inclusion of sensitive tests for these bacteria by milk processors in their quality assurance programmes would be

beneficial in developing procedures for improving shelf-life. AA

1500

Craven (HM) and Macauley (BJ). **Microorganisms in pasteurised milk after refrigerated storage. 2. Seasonal variation.** *Australian Journal of Dairy Technology* 47(1): 1992: 46-49

The effect of season on the types of microorganisms responsible for the spoilage of pasteurised milk was determined by examining samples from 3 Melbourne milk processors every fortnight for 5 seasons (winter to winter inclusively). Gram-negative bacteria, particularly *Pseudomonas* sp. were dominant in the majority of samples after storage at 4 and 7°C regardless of season. Gram-negative bacteria other than *Pseudomonas*, Gram-positive bacteria and yeasts were dominant in samples intermittently throughout the year. Pasteurised milk manufactured in summer had a better keeping quality than milk manufactured in winter. This is possibly because more thorough cleaning and sanitising procedures are applied by milk processors in the warmer period of the year. The difference in shelf-life between milk manufactured in summer and winter was more evident when milk was stored at 4 than 7°C. The results suggest that the degree of sanitation and cleaning may influence the type of pseudomonads which contaminate milk. AA

1501

Craven (HM) and Macauley (BJ). **Microorganisms in pasteurised milk after refrigerated storage. 3. Effect of milk processor.** *Australian Journal of Dairy Technology* 47(1): 1992: 50-55

The variation between manufacturers with respect to the types of microorganisms responsible for the spoilage of pasteurised milk was determined by examining milk from 3 processors every fortnight for 15 months. Gram-negative bacteria, particularly species of *Pseudomonas* were the predominant spoilage microflora in milk from all manufacturers after storage at 4 and 7°C. A greater number and variety of strains of *Pseudomonas*, particularly *P. fragi*, were found in milk with poorer keeping quality but differences in shelf-life for the 3 manufacturers could not be completely related to sp. Some extremely lipolytic or proteolytic strains of *Pseudomonas* were associated with specific milk processors, but the overall activity of isolates from each manufacturer was similar. The results suggest that the ability of pseudomonads to degrade milk fat and protein may contribute in part to survival in the milk processing environment. It was concluded that standard of hygiene (initial number of contaminants) and the lipolytic and proteolytic activity of the strains that grow to spoilage levels are the most important factors which determine the potential keeping quality of individual packages of milk. AA

1502

Marquez (MF), Lopez (MDR) and Garcia-Villanova (B). **Determination of total solids in milk by microwave drying and its effect on hydroxymethylfurfural formation.** *Australian Journal of Dairy Technology* 47(1): 1992: 56-57, 71

A microwave drying method and a standard air-oven method for moisture detn. (total solids) in various types of milk were compared. A considerable decrease in drying time was achieved using the microwave oven. For UHT, evaporated, condensed and powdered milk the drying times were 12, 35, 40 and 15 minutes respectively. The total solids content in evaporated and condensed milk was higher when determined by the microwave method. Milk samples dried in the microwave oven yielded higher hydroxymethylfurfural (HMF) contents than those dried in the air oven. AA

1503

Guinot-Thomas (P). **Technological and microbiological consequences related to urea addition to milk.** *Australian Journal of Dairy Technology* 47(1): 1992: 58-59

A comparative study of the physico-chemical, technological and microbiological properties of raw milk and urea-supplemented raw milk was performed. The results showed that urea had no effect on the parameters studied in the present work which were: pH, casein-fractions composition, micellar size, formagraph behaviour, cheese yield and microbiological counts; just an increase in the coagulation time was noted. AA

1504

Rohrbach (BW), Draughon (FA), Davidson (PM) and Oliver (SP). **Prevalence of *Listeria monocytogenes*, *Campylobacter jejuni*, *Yersinia enterocolitica*, and *Salmonella* in bulk tank milk: Risk factors and risk of human exposure.** *Journal of Food Protection* 55(2): 1992: 93-97

Milk samples (n = 292) from farm bulk tanks were analyzed for selected bacteria. Frequency of bacterial isolation was *Listeria monocytogenes* 12 (4.1%), *Campylobacter jejuni* 36 (12.3%), *Yersinia enterocolitica* 44 (15.1%), and *Salmonella* 26 (8.9%). The presence of one or more selected bacteria was not associated with grade classification of dairy, barn type, milking hygiene, reported incidence of clinical mastitis among cows, or the number of cows on the farm. Consumption of raw bulk milk was reported by 68/195 (34.9%) dairy producers, and of

bulk tanks from which raw milk was consumed. 17/68 (25%) were contaminated with one or more species of pathogenic bacteria. AA

Milk products

1505

Shilpa Vij and Gandhi (DN). **Isolation and identification of lactose fermenting yeasts from various dairy products.** *Journal of Food Science and Technology (India)* 30(3): 1993: 222-223

Among the lactose fermenting yeasts, isolated from samples of *dahi* (curd), cream and *paneer* (cottage cheese) whey, 30 and 6% of the isolates were identified as *Kluyveromyces fragilis* and *K. lactis*, respectively. Samples of cream and *dahi* contained both lactose fermenting and lactose non-fermenting yeasts, the latter being predominant in *paneer* whey. About 15 isolates of lactose fermenting yeasts showed a comparable leavening activity with that of conventional Baker's yeast (*Saccharomyces cerevisiae*). AA

1506

Mathur (BN), Whalen P, Shahani (R) and Shahani (KM). **Quantification of lactulose in heat processed dairy products by HPLC.** *Indian Journal of Dairy Science* 45(4): 1992: 190-193

This paper presents a HPLC method that permits rapid analysis of lactulose in heat processed milk and milk products using special techniques that permit rapid preparation of samples for direct application. The results indicated that in samples of processed milk where lactose levels are high and lactulose very low it is advantageous to hydrolyse the carbohydrates with lactose, and base quantification of lactulose on the amount of fructose produced. In infant foods where additional carbohydrates are added in the formulation, this particular approach permits more sensitive analysis of lactulose content. SRA

1507

Black (RG), Kuzyt (M) and Duggan (J). **Evaluation of a fluorometric assay for alkaline phosphate in fluid drying products.** *Australian Journal of Dairy Technology* 47(1): 1992: 64-67

A rapid fluorometric assay method for alkaline phosphatase (ALP) residues in milk and cream was compared with the current Australian Standard Method, AS2300.1.10. The new method was found to be fast, sensitive to very low levels of ALP and had good precision. Comparative assays by both methods showed only fair correlation, considered to be due to the poor discrimination capability of the current method. 'Cut-off' values to define properly pasteurised milk by the new method differed among the types of milks studied, when compared with the single 'cut-off' value currently applied by the Australian Food Standards Code. AA

Butter milk

1508

Joshi (NS) and Thakar (PN). **Utilization of butter milk in manufacture of buffalo milk Cheddar cheese: Changes during ripening.** *Journal of Food Science and Technology (India)* 30(3): 1993: 172-175

Buffalo milk was standardized to casein : fat ratio of 0.7, using skim milk and various proportions of sweet cream butter milk for preparing Cheddar cheese. Incorporation of butter milk in cheese significantly increased the moisture, acidity, maturity index and total volatile fatty acid contents compared to control cheeses, whereas the pH was reduced. Sensory evaluation of the cheeses revealed that the cheese made by substituting 25% casein of skim milk by butter milk was at par with that of control. Further addition of butter milk in buffalo milk brought deterioration in the cheeses. AA

Cheese

1509

Jana (AH) and Upadhyay (KG). **Homogenisation of milk for cheese making - A review.** *Australian Journal of Dairy Technology* 47(1): 1992: 72-79

Reviews the effects of homogenisation on cheesemaking characteristics (acid development, rennet action, syneresis, curd forming properties, and yield of cheese and recovery of milk constituents) and on the quality (colour, flavour, body and texture, acidity, pH, cheese composition, rheology and ripening changes) of cheese: Conc. milk for cheesemaking preparation of recombined milk cheeses: modifications to the conventional process to improve cheesemaking: advantages and disadvantages of homogenisation and the proper choice of homogenisation conditions like pressure, temp. and the portions of milk to be homogenised. 114 references. GS

Cottage cheese

1510

Davey (JA) and Eyles (MJ). **Discolouration of cottage cheese caused by *Rahnella aquatilis* in the presence of glucono** δ-lactone. *Australian Journal of Dairy Technology* 47(1): 1992: 62-63, 82

An intense brown discolouration of cottage cheese that developed during retail distribution of isolated batches was shown to be associated with growth of the coliform (*R. aquatilis* and the presence of the acidulant glucono-δ-lactone (GDL). Experimental trials showed that the presence of both *R. aquatilis* and GDL is necessary for the defect to occur and that full-fat, low-fat and low-fat/reduced-salt cottage cheese are affected equally. The discolouration did not occur in cheese acidified with lactic or citric acid, or in cheese that contained no added acidulant. The time required for the discolouration to occur decreased with increasing storage temp. *R. aquatilis* isolated from the spoiled cheese grew in culture media at temp. as low as 1 plus or minus 1°C. AA

Feta cheese

1511

Vosniakos (FK), Giouvanoudi (AS), Moumtzis (AA), Batalas (TA) and Kanakoltsis (P). **Mechanism of iodine-131 transport from Feta cheese upon immersion in water and neutral salt solutions.** *Australian Journal of Dairy Technology* 47(1): 1992: 14-17

Cheese samples were produced using milk artifically contaminated with radioactive ^{131}I. The radioactivity doses used were up to 15 kBq Kg^{-1}. Tests were carried out to investigate the effect of NaCl, KCl and water sol. on the radionuclide transport in Feta cheese. There was no difference between NaCl and KCl sol. in removing ^{131}I from Feta cheese. The penetration of ^{131}I from radiocontaminated NaCl, KCl and water sol. to ^{131}I-free Feta cheese was also examined in order to explain the transport mechanism of ^{131}I transport in Feta type cheeses is a complex process and cannot be explained only by a constant diffusion coeff. The whole process can be described by taking into consideration the microstructure of Feta cheese. AA

1512

Kaminarides (SE) and Laskos (NS). **Yeasts in factory brine of Feta cheese.** *Australian Journal of Dairy Technology* 47(1): 1992: 68-71

Eighteen brine samples from 6 large Greek Feta cheese factories were examined. Three samples were taken from each factory at different periods of the year. The examination involved study of the yeast flora of Feta cheese brine and also the total bacterial count, the psychrotrophic bacteria count, pH and thebrine NaCl concn. The results showed yeasts were present in all brine samples tested with numbers ranging from 5.5×10^2 to 3.4×10^6mL of brine. 180 different yeasts colonies were isolated and identified, with the most common species found to be *Saccharomyces cerevisiae* (36%), *Sacch. cerevisiae* (*Italicus*) (23%), *Candida famata* (17%) and *Pichia membranaefaciens* (12%). The last 2 yeasts tolerated high brine NaCl concn. The yeasts *C. sphaerica*, *Torulaspora delbrueckii*, *C. colliculosa*, *C. robusta*, *Sacch. exiquus*, *Sacch. cerevisiae* (*chevalieri*) and *C. tropicalis* were also found. The total bacterial counts in most samples were high (10^4 - 10^8/mL brine) and the mean values of psychrotrophic bacteria and moulds were 10^4/mL of brine respectively. The mean pH of brine was 4.6 and NaCl concn. 3.5% w/v. AA

Mozzarella cheese

1513

Ghosh (BC) and Singh (S). **Storage studies of Mozzarella cheese. Part 1. Sensory and rheological characteristics.** *Indian Journal of Dairy Science* 45(4): 1992: 199-202

Mozzarella cheese packed in polyethylene pouches was found to be acceptable at the end of 14 days of storage in a refrigerator. Application of vacuum in packaging increased the shelf-life ranging from 21-42 days under similar storage conditions. The cryovac packaging in polyvinylidene chloride film increased the shelf-life to an av. of 42 days. The cheese under similar conditions of packaging were acceptable even at the end of 90 days of storage in a deep freeze. The melting and fat leakage were found to increase with the increase in storage period. The cheese stored in a deep freeze showed relatively less increase in the melting quality regardless of packaging than the cheese stored in a refrigerator. The stretchability of Mozzarella cheese was found to decrease with the increase in storage period both in a refrigerator and a deep freeze. AA

1514

Ghosh (BC) and Singh (S). **Storage studies of Mozzarella cheese. Part II. Chemical changes.** *Indian Journal of Dairy Science* 45(4): 1992: 203-208

Mozzarella cheese was prepared from buffalo milk and packaged in polyethylene (300 guage) with and without vacuum and cryovac packaged in polyvinylidene chloride film (150 guage). The packaged cheeses were stored in a refrigerator (8 - 10°C) and a deep freeze (-10 to -15°C). A continuous moisture loss occurred in all the samples at both the storage temperatures. The initial pH of cheese decreased from 5.36 to 5.16 at the end of 28 days of storage in a refrigerator when the cheese was packaged in polyethylene and to the same value at the end of 49 days when packaged in cryovac. The pH dropped to 5.22 in case of deep frozen samples at the end of 90 days. A gradual increase in titratable acidity occurred in all the cheese samples stored at both the temp., however, the rate of

increase was more in refrigerated samples than in frozen samples. The rate of increase of soluble protein was faster at refrigerated temp. compared to deep frozen samples. AA

1515

Buazzi (MM), Jhonson (ME) and Marth (EH). **Fate of *Listeria monocytogenes* during the manufacture of Mozzarella cheese.** *Journal of Food Protection* 55(2): 1992: 80-83

Mozzarella cheese was made from a mixture of pasteurized whole and skim milk which was inoculated to contain (10^4 - 10^5 CFU *Listeria monocytogenes* (strain Ohio, Calfornia, or V7) per ml. Temp. of milk was maintained at 40°C (104 F) for 30 min when curd became resilient and the pH reached 5.90 - 5.93. Populations of *L. monocytogenes* changed at different rates during the various phases of making Mozzarella cheese. During the early stages of curd formation, numbers of *L. monocytogenes* were ca. 4-fold greater in curd than in whey. Numbers of *L. monocytogenes* in freshly cut curd were 25 to 38% greater than in inoculated milk. Cooking curd at 40°C for ca. 30 min caused a decrease of ca. 38% as compared to numbers of the pathogen in curd after cutting. During Cheddaring of curd, numbers of *L. monocytogenes* increased by ca. 25%, over numbers at the end of cooking. Placing of curd in hot water [77°C (170°F)] and stretching for 3-4 min caused complete demise of the pathogen, as determined by our methods. The curd temp. during stretching was 58 to 65°C (136 to 149°F). Results of cold enrichments were all negative for stretched and brined curd. *L. monocytogenes* failed to survive during the making of Mozzarella cheese as done in this study. AA

Swiss-type cheese

1516

Rohm (H), Lederer (H) and Ginzinger (W). **Relationship between rheological properties and composition of Swiss-type cheese. 1. Multiple regression analysis.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 253-260

Rheological properties (fracture stress, fracture strain and modulus of deformability) and chemical composition (19 parameters) of 48 Swiss-type cheese samples were investigated. Rheological properties were related to chemical measures by linear multiple regression analyses. Only regression models with stimulus variables showing significant parameter estimates, giving significant contributions to total R^2 and without significant correlations between stimulus variables, were considered. Fracture stress was found to increase with decreasing water/solids-non-fat ratio and decreasing lactic acid content (R^2 = 0.713). 58.7% of the variation of fracture strain was explained by glutamic acid equivalents content (negative relationship), Ca content (-), pH (+) and trichloracetic acid (TCA) soluble nitrogen (-), in order of decreasing importance. The modulus increased with increasing propionic acid content, dry matter and chloride in aqueous phase, and decreased with TCA soluble nitrogen and pH (total R^2 = 0.579). These relationships are discussed with respect to literature findings. AA

Ice cream

1517

Matushek (MG), Curiale (MS), Mcallister (JS) and Fox (TL). **Comparison of various plating procedures for the detection and enumeration of coliforms in ice cream and ice milk.** *Journal of Food Protection* 55(2): 1992: 113-115

Eight plating procedures for the detection and enumeration of coliforms in ice cream and nonfat frozen dessert were compared. The procedures were: (i) direct plating of 1 ml, (ii) 2 ml, or (iii) 3 ml of product with violet red bile agar (VRBA), (iv) direct plating of 5 ml of product with VRBA in a large petri dish, (v) plating 10 ml of a 1:10 dilution of the product across three plates poured with VRBA, and (vi) plating 1 ml of a 1:10 dilution with VRBA, and (vii) plating 1 ml of a 1:10 dilution of Petrifilm *E. coli* Count (PEC) plates incubated for 24 and (viii) 48 h. Three samples of ice cream (high-fat chocolate, high-fat vanilla, and high-fat strawberry) and 3 samples of frozen dessert (fat-free chocolate, fat-free vanilla, and fat-free strawberry) were selected as representative products and were inoculated with coliforms for use in the study. The data indicated that direct plating of ice cream or frozen dessert was less reliable than plating a diluted product for detection and enumeration of coliforms. Results of platings with VRBA and PEC of 1-ml portions of a 1:10 dilution were closely related to the results of the Standard Methods agar procedure of plating 10 ml of a 1:10 dilution for detection and enumeration of coliforms. AA

Jamun

1518

Rajendran (S), Godavari Bai (S) and Narasimhan (KS). **Fumigation of *jamun* ready-mix.** *Journal of Food Science and Technology (India)* 30(3): 1993: 226-228

The sensory quality of *gulab jamuns* (an Indian milk-sweet preparation), prepared from *jamun* ready-mix samples fumigated with phosphine at the

effective dosage of 2 g/m^3 with 5 days exposure period at 29 plus or minus 2°C, was satisfactory. The levels of phosphine residues in the ready-mix samples were 0.16, 0.02 and 0.01 p.p.m., respectively after 2, 7 and 12 days aeration, following fumigation. No residues were detected in ready-to-eat product. AA

Gulabjamun

1519
Smita Deshmukh, Sammanwar (RD) and Sorte (GD). **Effect of homogenization of milk on the quality of *Gulabjamun*.** *Journal of Food Science and Technology (India)* 30(3): 1993: 211-212

Khoa prepared from unhomogenized and homogenized milk was blended with maida at the ratio of 3:1 and baking powder was added at different levels. The *Gulabjamun* (an Indian sweet) prepared from unhomogenized milk *khoa* with 0.08% baking powder showed good acceptability. The homogenization could not improve the quality of *Gulabjamun*. AA

1520
Gulhati (HB), Rathi (SD), Syed (RM) and Bache (CS). **Studies on qualities of *gulabjamun*.** *Indian Food Packer* 46(6): 1992: 43-46

Gulabjamun recipe combinations from buffalo milk based *khoa*, (R_1), cow milk khoa (R_2), skimmed milk powder based *khoa* (R_3) and whole milk powder based *khoa* (R_4) were standardised to maintain uniform quality. R_1 with ingredients, buffalo milk based *khoa* (64.654%), refined wheat flour (20%), chhana (15%), baking powder (0.25%) and cardamom (0.1%) was superior in sensory, chemical and textural quality compared to the other three. GS

Paneer

1521
Mistry (CD), Sukhminder Singh and Sharma (RS). **Physicochemical characteristics of *Paneer* prepared from cow milk by altering its salt balance.** *Australian Journal of Dairy Technology* 47(1): 1992: 23-27

Raw cow milk samples of 3.5% fat with added 0.02% calcium sulphate (T1), 0.05% calcium sulphate (T2), 0.02% disodium hydrogen phosphate (T3), 0.05% disodium hydrogen phosphate (T4), and no additive (T0) were heated at 82°C for 5 min and coagulated at 82°C with 1% citric acid sol. *Paneer* was obtained by pressing the curd in a mould. Test and control samples of *paneer* showed no significant differences in the levels of total solids, fat, protein, lactose, ash and soluble protein, though coagulant requirements for complete coagulation of milk decreased in the order: T2 > T1 > T0 > T3 > T4. Sensory scores of freshly fried and unfried *paneer* showed significantly ($P < 0.05$) higher scores for flavour, body and texture of test samples than of control samples. Best sensory scores of raw paneer were achieved at 0.05% (w/v) calcium sulphate but in fried *paneer* it was best with 0.02% (w/v) added calcium sulphate. Calcium sulphate was preferred to disodium hydrogen phosphate as it reduced the amount of coagulant required for complete coagulation of milk. AA

Pedas

1522
Thakur (BR), Semwal (AD) and Arya (SS). **Packaging requirements and stability of sorbate preserved *khoa* sweets (*pedas*).** *Indian Food Packer* 46(6): 1992: 53-56

Pedas with and without added sorbic acid (0.4%) were prepared and packed in paper Al foil-polyethylene laminate (PFP), polypropylene (PP) and polyethylene (PE) pouches stored at 37 plus or minus 1°C. Samples without added sorbic acid spoiled within 2 wks of storage due to excessive mold growth, fermented odour and gas formation. *Pedas* containing sorbic acid did not support any microbial growth during storage for 1 yr. However, during storage, samples packed in PP and PE lost moisture and became hard and brittle while those packed in PFP remained soft but browned faster and had higher free fatty acid. Peroxide and thiobarbituric acid values were higher in PE followed by PP and PFP packed samples. Sorbic acid degraded during storage of *pedas* and the rate of degradation was highest in PE followed by PP and PFP stored samples. AA

Shrikhand

1523
Sharma (DK) and Reuter (H). **Ultrafiltration technique for *Shrikhand* manufacture.** *Indian Journal of Dairy Science* 45(4): 1992: 209-213

Chakka, the base material for *shrikhand*, could be successfully made by ultrafiltration (UF) using ceramic membrane module. There was 23% extra yield of *chakka*, when UF was employed as against traditional method, due to the recovery of whey proteins in *chakka*. *Shrikhand* of very good quality could be prepared by UF chakka. This process is industrially feasible and provide 16.28% milk saving and easy automation and process control. In India,

there is sufficient scope for adopting this UF method for making *shrikhand*. *SRA*

1524

Prajapathi (JP), Upadhyay (KG) and Desai (HK). **Comparative quality appraisal of heated *Shrikhand* stored at ambient temperature.** *Australian Journal of Dairy Technology* 47(1): 1992: 18-22

Shrikhand, an Indian fermented, partially drained, sweetened milk product, was subjected to 5 post-production heat treatments (PPHT) and stored at 35 - 37°C. The samples were subjected to chemical, physical, microbiological and organoleptic evaluation at 0, 5, 10 and 15 days. The heated samples had significantly ($P < 0.05$) higher FFA content at day 0 compared to control. Consistency of the product improved slightly upon PPHT. Depending on the severity of the heat treatment applied during PPHT, it had a marked destructive effect on the groups of microorganisms studied. During storage, PPHT stabilised the product against microbial and biochemical changes with concomitant improvement in the shelf-life of the product, as revealed by the superior organoleptic scores of these samples. Heat treatment of *shrikhand* at 70°C for 5 min yielded a product with superior overall quality and a shelf-life of 15 days at 35 - 37°C. AA

Wheys

1525

Daufin (G), Michel (F) and Merin (U). **Ultrafiltration of defatted whey: Influence of some physico-chemical characteristics.** *Australian Journal of Dairy Technology* 47(1): 1992: 7-13

Ultrafiltration of defatted whey clarified by microfiltration has been studied using a lab. rig and a 4-stage industrial plant equipped with M_5 Carbosep inorganic membranes. Flux versus transmembrane pressure characteristics did not reveal limiting flux even at a moderate tangential flow rate of 4.5 $m.s^{-1}$ and high pressure, up to 8 - 9 bars. With a feed rich in Ca and phosphate ions (microfiltrate and WPC from 1st UF stage), irreversible fouling caused by precipitation of minerals within the membrane greatly contributed to UF performance decrease with time at natural feed pH (6.4) and up to higher pH (7.0). When the feed used was prepared with a low mineral content, proteins appeared to be less fouling (adsorption and concn. polarisation) at near neutral and alkaline pH. AA

Yoghurts

1526

Rohm (H). **Viscosity determination of stirred yoghurt.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 297-301

Viscosity of commercial stirred yoghurt was evaluated with a Couette type, strain-controlled rheometer by using concentrical cylinder, cone and plate and parallel plant geometries. Yoghurt showed a yield stress at low shear rates and obeyed power law behaviour at shear rates > $1s^{-1}$. With the concentrical cylinder system, a significantly lower yield stress was observed. Total time where a particular shear rate range was applied affected both yield stress and the coeffi. of the power law equation. Apparent viscosities and hysteresis areas determined by thixotropic loop experiments depended heavily on the degree of shear rate increase and final shear rate. AA

MEAT AND POULTRY

Meat

1527

Syed Ziauddin (K), Rao (DN) and Amla (BL). ***In vitro* study on the effect of lactic acid and sodium chloride on spoilage and pathogenic bacteria of meat.** *Journal of Food Science and Technology (India)* 30(3): 1993: 204-207

In vitro studies demonstrated the growth inhibitory property of lactic acid on pathogenic bacteria. A combination of lactic acid and NaCl markedly enhanced the inhibitory effect against different species of bacteria responsible for microbial spoilage of meat and meat products as well as those causing meat-borne infections and intoxications. AA

1528

Gross (EM), Roth (Y), Uzieli (V), Hass (A), Toker (M), Belmaker (E), Barkay (A), Ab (L), Toker (M). **Multiple outbreaks of niacin (nicotine acid) intoxication due to addition of meat "enhancer" to products by two different meat processors.** *Journal of Food Protection* 55(2): 1992: 116-119

Five outbreaks of facial flushing accompained by a feeling of warmth and pruritus were reported in people eating commercially prepared frozen ground beef or processed veal steaks. The outbreaks occurred during a 7-month period in Israel. In all instances niacin (nicotinic acid), a substance known to cause these signs and symptoms was measured in amounts ranging from 0.3 to 6.0 g/kg of raw beef. The chemical was illegally added by two producers in order to enhance colour of the meat. AA

1529

Dickson (JS) and Anderson (ME). **Microbiological decontamination of food animal carcasses by washing and sanitizing systems: A review.** *Journal of Food Protection* 55(2): 1992: 133-140

Microbial contamination of animal carcasses is a result of the necessary procedures required to process live animals into retail meat. The contamination can be minimized by good manufacturing processes, but the total elimination of foodborne pathogenic microorganisms is difficult, if not impossible. A variety of methods have been developed to reduce the levels of contaminating bacteria on carcasses, although most of the current methods focus on washing and sanitizing procedures. The commonly used sanitizing agents include hot water, chlorine, and short-chain organic acids. The effectiveness of these compounds varies by the concn. used, the temp. of the sanitizers and contact time, the sensitivity of the native microflora to the specific compound, and to a certain extent the design of the specific experiments. The consensus of the research is that carcass sanitizing can reduce the initial levels of bacteria on the surface of the carcass. AA

Beef

1530

Kulkarni (VV), Kowale (BN), Kesava Rao (V) and Murthy (TRK). **Storage stability and sensory quality of washed ground buffalo meat and meat *patties* during refrigerated storage.** *Journal of Food Science and Technology (India)* 30(3): 1993: 169-171

Effect of washing with water and EDTA sol. (2%, pH 4.5) on the keeping and sensory qualities of ground buffalo meat and meat *patties* during refrigerated storage of 20 days at 4 plus or minus 1°C was studied. Myofibrillar fragmentation index (MFI) of raw and EDTA-washed meat did not differ significantly, but exhibited pronounced increase in water-washed samples during storage and was accompanied by higher microbial counts. Tyrosine contents in all the samples increased significantly ($P < 0.01$) during later days of storage. Washing generally reduced thiobarbituric acid (TBA) value and EDTA-washed meat had lowest TBA value. Microbial counts of EDTA-washed meat were significantly ($P < 0.01$) lower than those of unwashed. EDTA-washed meat *patties* had poor binding and juiciness. *Patties* prepared from EDTA-washed meat and stored for 20 days at 4 plus or minus 1°C were rated as slightly acceptable. Water-washed meat *patties* were comparable to raw meat *patties*. AA

1531

Kesava Rao (V) and Kowale (BN). **Fatty acid composition of adult buffalo meat during processing and storage.** *Journal of Food Science and Technology (India)* 30(3): 1993: 216-218

Three muscles viz. *Triceps brachii*, *Longissimus dorsi* and *Biceps femoris* from adult buffalo (*Murrah* type), were subjected to broiling and pressure cooking and analysed for changes in fatty acids at storage intervals of 0, 3, 6, 9, 30, 60 and 90 days under refrigerated and frozen conditions, respectively. Influence of anatomical location on fatty acid composition was evident. A gradual decrease in mono- and poly-unsaturated fatty acid contents was associated with the increase in saturated fatty acids due to processing. There were significant increases in myristic, palmitic, stearic acids and significant decreases in oleic and linoleic acid contents during storage. AA

Pork

1532

Kumar (V) and Bachhil (VN). **Studies on the development of pork pickle: Effect of different preservatives on its quality and shelf-life.** *Indian Food Packer* 47(1): 1993: 15-21

Three recipes of pork pickle were evaluated for better acceptability, quality and shelf-life. The most acceptable recipe contained lean pork (1000 g), common salt (35 g), vinegar (100 ml), citric acid (5 g), dry spice mix (35 g), green curry stuff (50 g) and mustard oil (250 ml). It had an overall acceptability of 6.05, 6.55, 6.16, 6.00 and 6.27 on 7 point hedonic scale at 0, 30, 60, 90 and 120 days respectively. Protein and pH values were 23.46 and 4.89 respectively on 120th day. Microbial counts viz., total viable counts, halophilics and yeast and molds generally remained in the range of 3 log cycles throughout the storage. None of the samples was positive for *E. coli*. Addition of sodium benzoate (0.2%, 0.1%) and sodium nitrite (200 p.p.m.) either singly or in combination did not cause any significant additional advantage. AA

Products

Patties

1533

Seru Ganesh Babu, Kesava Rao (V) and Kowale (BN). **Recovery of proteins from ovine lungs and rumen for their incorporation in meat *patties*.** *Journal of Food Science and Technology (India)* 30(3): 1993: 176-179

Alkaline extraction method gave a better recovery of proteins from ovine lungs and rumen. The method is simple and lowered microbial load in protein isolates (PI), thereby rendering the proteins microbiologically safe. The PI could be incorporated in the mutton *patties* upto 20% level, replacing high cost lean, without any loss of quality characteristics and sensory attributes. The mutton *patties* incorporated with PI could be stored safely at refrigerated temp. (4 plus or minus 1°C) for 15 days, without any deteriorative changes in quality and acceptability. AA

Wieners

1534

Degnan (AJ), Yousef (AE) and Luchansky (JB). **Use of *Pediococcus acidilactici* to control *Listeria monocytogenes* in temperature-abused vacuum-packaged wieners.** *Journal of Food Protection* 55(2): 1992: 98-103

Pediococcus acidilactici JBL 1095 (pediocin AcH producer) and *P. acidilactici* LB42 (bacteriocin in nonproducer) were evaluated for the production of antilisterial compounds in packages of all-beef wieners. Commercially processed, freshly manufactured, unpackaged wieners were surface inoculated (ca. 10^5 CFU/g) as follows: (i) untreated control; (ii) a three strain (Scott A, V7, 101M) mixture of *Listeria monocytogenes*; (iii) strain JBL1095; (iv) *L. monocytogenes* and strain JBL1095; and (v) *L. monocytogenes* and strain LB42. Wieners were vacuum packaged and cell numbers, pH, and bacteriocin activity within packages were determined following storage at refrigeration (4°C) or abuse (25°C) temp. for 72 and 8 days, respectively. *L. monocytogenes* and pediococci survived in packages held at 4°C, but pediococci did not produce acid or pediocin during refrigerated storage. At 25°C, total numbers of *L. monocytogenes* (treatment ii) increased 3.2 $\log_{10}$ CFU/g and the pH of the fluid (exudate) within packages increased from 5.5 to 5.6. In contrast, *L. monocytogenes* survived but did not grow in packages inoculated with strain LB42 (treatment v), and was inhibited (average reduction of 2.7 $\log_{10}$ CFU/g) in packages inoculated with strain JBL1095 (treatment iv) during storage at 25°C for 8 days. The pH of exudate in packages inoculated with strains JBL1095 (treatment iv) or LB42 (treatment v) showed a similar decline (ca. 5.5 to 4.6). The onset of bacteriocin production coincided with early-logarithmic growth of JBL1095 (treatment iv) and continued into the late logarithmic phase. These data suggest that bacteriocinogenic pediococci can be used to control *L. monocytogenes* in temp.-abused, cook/chill meats. AA

Poultry

1535

Sharma (BD) and Sen (AR). **Mechanically deboned poultry meat quality and utilization.** *Poultry Guide* 30(5): 1993: 29-30

Improvement in packaging quality and utilisation of mechanically deboned poultry meat produced by (i) pasteurisation with addition of lactic acid; (ii) adjustment of meat pH from 5 upto 8 along with salt preblending to increase emulsifying capacity and tissue binding; (iii) addition of antioxidant mixture containing BHA, propylgallate and citric acid; (iv) vacuum packaging in suitable laminates; combination of CO_2 packaging and sorbate treatment and (v) use of 6% polyphosphates slush ice chilling overnight of spent layer carcasses is discussed. GS

Chickens

1536

Anand (SK), Mahapatra (CM), Pandey (NK) and Verma (SS). **Effect of chilling treatments on microbial quality of chicken during refrigerated storage.** *Indian Journal of Poultry Science* 28(1): 1993: 36-40

Effect of different chilling media, 5% brine, 4% polyphosphate and slush ice on reducing microflora of dressed chicken during refrigeration (4 plus or minus 1°C) was studied. Polyphosphate reduced different microorganisms better than brine and slush ice but in all treatments the reduction of microflora was slightly compared to control. So none of the chilling treatment at the tested level extended shelf-life beyond 6 days. SD

Broilers

1537

Barnhart (HM) and Pancorbo (OC). **Cytotoxicity and antibiotic resistance profiles of *Aeromonas hydrophila* isolates from a broiler processing operation.** *Journal of Food Protection* 55(2): 1992: 108-112

The cytotoxicity and antibiotic resistance profiles of *Aeromonas hydrophila* isolates recovered from broiler carcasses and chill water samples taken from a Georgia processing plant were determined. Carcasses were sampled at pre- and post-evisceration locations, immediately after immersion chilling, and after being boxed, iced and refrigerated for 48 h. Grab samples of chill water were randomly selected for *A. hydrophila* recovery. Resistance of isolates to 9 antibiotics was

determined with the Bauer disc diffusion method (i.e., to ampicillin, cephalothin, streptomycin, kanamycin, chloramphenicol, naladixic acid, tetracycline, neomycin, and gentamycin). Multiple antibiotic resistance occurred in 46.2% of 119 isolates. The majority of the multiple antibiotic-resistant isolates (76.4%) were resistant only to ampicillin and cephalothin. The remaining muitiple antibiotic-resistant isolates (23.6%) were resistant to various combinations of 2, 3 or 4 antibiotics, most of which were recovered from carcasses immediately after evisceration. Cytotoxin activity was detected in 63.8% of all isolates using the Y-1 mouse adrenal tumor cell line. Cytotoxin positive isolates were recovered from all sampling locations including chill water. The highest cytotoxicity titers were shown among isolates recovered from carcasses immediately after evisceration. These data suggest bird fecal contamination as an important source of *A. hydrophila* in broilers and broiler processing plants rather than environmental contamination. AA

Turkeys

1538

Sahoo (J) and Berwal (JS). **Utilization of turkey fat and skin for production of sausages.** *Journal of Food Science and Technology (India)* 30(3): 1993: 224-225

The effect of incorporation of 15, 20, 25% turkey fat and skin (TFS) on physico-chemical properties, proximate composition and organoleptic quality of cooked turkey sausages was evaluated. TFS levels had no effect on pH, though emulsifying capacity (EC), emulsion stability (ES) and cooking loss decreased and extract release vol. (ERV) increased with increasing level of incorporation. Organoleptic scores were marginally (p less than or equal to 0.05) affected by TFS levels. However, inclusion of 25% TFS scored lowest in general. AA

Products

Eggs

1539

Harpreet Singh, Pal (SK) and Raheja (KL). **Genetic and phenotypic parameters for egg production and egg quality traits in Guinea fowl.** *Indian Journal of Poultry Science* 28(1): 1993: 12-19

Heritability and genetic correlations were studied for indigenous Guinea fowls. Heritability value for age at 1st egg was (0.56 plus or minus 0.19), total egg production (0.43 plus or minus 0.13), 90 days egg production (0.47 plus or minus 0.18), egg wt. (0.75 plus or minus 0.21). Negative genetic correlations were observed for age at 1st egg with egg production (90 days) and egg wt. and also between albumen quality (Haugh unit), egg wt. and shell wt. Egg quality traits showed considerable variations. GS

1540

Sahu (NP), Sahu (BK), Dehuri (PK), Panda (NC) and Mishra (SC). **Effect of feeding polanga oil cake on egg production, egg quality and hatchability of white leghorn layers.** *Indian Journal of Poultry Science* 28(1): 1993: 32-35

Polanga (*Callophyllum inophyllum*) oil cake (POC) is rich in crude protein (26.51%), Ca (0 - 60%) and P (0.84%). White leghorn pullets were fed with feeds containing 0, 5, 10, 15 and 20% POC for 6 months. POC lowered the feed conversion ratio and reduced the cost of egg production. 15% or more POC significantly depressed egg production. 10% or more POC decreased the % fertility and hatchability. There was no change in quality of eggs upto 20% POC. Upto 10% incorporation of POC is recommended. SD

SEAFOODS

Crabs

1541

Oh (D), Marshall (DL), Moody (MW) and Bankston (JD). **Comparison of forced-air cooling with static air-cooling on the microbiological quality of cooked blue crabs.** *Journal of Food Protection* 55(2): 1992: 104-107

Microbiological analyses were made on samples of cooked blue crab taken immediately after debacking and either forced-air cooling or static-air cooling. Forced-air cooling had significantly lower ($P < 0.05$) total coliform and fecal coliform counts, 2.51 and 2.30 $\log_{10}$ MPN/100 g, compared with those of static-air cooling, 2.83 and 2.60 $\log_{10}$ MPN/100 g. All treatments had less than 2.30 $\log_{10}$ MPN/100 g *Escherichia coli*. *Staphylococcus aureus* counts in the forced-air cooled crabs were approx. 4-fold lower than counts in static-air cooled crabs. The aerobic plate counts and psychrotrophic plate counts were significantly lower ($P < 0.01$) by 1.04 and 0.81 $\log_{10}$ CFU/g, respectively, by forced-air cooling compared to static-air cooling. Thermocouple temp. readings were used to determine differences in cooling rates between forced-air and static-air cooling. After 1.5 h of cooling, the initial precooled crabmeat temp. of 34°C (93°F) was reduced by forced-air cooling and static-air cooling to 4°C (40°F) and 20°C (67°F), respectively. The rates of cooling using forced-air

and static-air were significantly different ($P < 0.01$). AA

Oysters

1542

Chellappan (NJ). **Studies on the suitability of frozen oyster meat for smoking.** *Fishery Technology* 30(1): 1993; 77-78

Depurated oyster meat shucked after steaming was dipped in 2% brine containing 0.2% citric acid for 10 min, drained, packed in 2 kg cartons lined inside with polyethylene sheet, frozen in -40°C and stored at -20°C. Samples were taken every month, thawed in running water at 2 to 5°C, drained, then dipped in 5% NaCl sol. for 5 min and drained. Brined meat was smoked at 40 - 45°C for 30 min initially, then at 72 - 75°C for 75 min, and cooled to room temp. Wt. loss on thawing was 10% for first 2 months and increased to 24.63% by 7 months. Wt. loss during smoking increased proportional to the period of frozen storage (27.82%) initially and became 40.32% in 7 month storage. At 2 months storage meat was creamy and tender textured with sea-weedy flavour. By 7 month meat became slightly pink, hard, with no characteristic flavour. Good quality smoked oyster can be obtained from frozen oyster meat if the frozen storage period is short. SRA

Prawns

1543

Joseph (AC), Prabhu (PV) and Narayanan Nambiar (V). **Storage characteristics of ready-to-serve fried Thelly prawns (*Metapenaeus dobsoni*) at ambient temperature.** *Fishery Technology* 30(1): 1993; 31-34

Fresh thelly prawns procured from market were washed and sun dried (control) and test samples treated with NaCl and citric acid and dried. Dried samples after removing head, tail and legs were fried in refined groundnut oil, cooled and packed in polyester/polyethylene bags and stored at ambeint temp. of 22 - 28°C. Samples were analysed at intervals for physical, chemical, sensory and bacteriological characteristics. Treatments with NaCl and citric acid prior to initial sun drying enhanced both quality and shelf-life to 55 days compared to 42 days for the control. SRA

1544

Abraham (TJ) and Jeyachandran (P). **Comparative microbiology of commercial and laboratory prepared prawn pickles.** *Fishery Technology* 30(1): 1993; 81-82

This study showed that the pH value counts of Staphylococci, anaerobic gas producers and anaerobic spore formers of commercial pickle were higher and the titratable acidity slightly lower than the laboratory samples. Both samples had almost equal concn. of NaCl. No lactic acid bacteria, mold and yeasts were observed in both samples. SRA

Shrimps

1545

Balakrishnan. **Application of concepts like quality, quality management and quality system in frozen shrimps industry.** *Seafood Export Journal* 25(2): 1993; 25-30

Deals in detail sensory quality, microbial aspects, quality specifications, quality policy, quality profile, personnel profile, management role and processing of shrimp. Adoption of International Standards Organisation 9002 model with incorporation of HACCP concepts into the quality system in the frozen shrimp industry and streamlining the processing and supply of shrimps as per the consumer requirements are recommended. GS

Fish

1546

Demir (S) and Evoin (S). **Drying characteristics of salted fish in a greenhouse-type solar dryer.** *Fishery Technology* 30(1): 1993; 35-39

Drying characteristics of salted fish (whitings, *Merlangius merlangus*) were investigated by the drying experiments carried out in a greenhouse constructed for dehydration and augmented by parabolic reflectors. Drying time of samples was 26 h in the greenhouse and 38 h for samples dried outside to 25% moisture content. Thin layer drying theory was applied in order to explain and compare drying characteristics. Drying constant of that equation was min. for samples dried in the greenhouse on the conveyor belt augmented by solar reflectors. AA

1547

Sanjeev (S) and Surendran (PK). **Effect of storage on enterotoxigenic *Staphylococcus aureus* in cured fish.** *Fishery Technology* 30(1): 1993; 79-80

Five enterotoxigenic strains of *Staphylococcus aureus* A-100, BS-6, C-361, D-472 and E-326 which produced enterotoxin A, B, C, D and E respectively were studied. Individual strains were grown in Brain Infusion Broth at 37°C for 48 h. 2 kg of cured fish *Lactarius lactarius* samples were treated with *S. aureus* and kept at ambient temp. Total bacterial

count and *S. aureus* load were analysed immediately after inoculation and after 2, 4, 6, 10 and 13 days storage. Two log reduction in total bacterial count by 13th day and 3 log reduction in enterotoxigenic *S. aureus* load by 10th day of storage were observed. Samples were free from *s. aureus* at the 13th day of storage. Enterotoxigenic *S. aureus* strains could not survive in cured fishes for more than 13 days even if the initial load was 2.7×10^5/g. SRA

1548

Plowman (JE) and Herbert (BR). **Identification of the species of origin of cooked fish by isoelectric focussing.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 224-227

Some proteins in fish are relatively heat-stable. They can be extracted with water and separated by isoelectric focusing to produce a band pattern that is unique to a species, even after it has been cooked. Major changes occur to this pattern in the first few min. of cooking, but other species - specific changes have been observed to occur over longer cooking times. Using a range of cooked standards, it has been possible to identify the species of origin of fish from retailers of fish and chips. AA

1549

Saito (H) and Udagawa (M). **Application of NMR to evaluate the oxidative deterioration of brown fish meal.** *Journal of the Science of Food and Agriculture* 58(1): 1992: 135-137

Peroxide value (PV) and acid value (AV) are generally used as indices of deterioration in edible oil. However, they are not always useful for evaluation of oil deterioration in fish meal because the PV rises at the initial stage of oxidative deterioration, reaches a peak and then declines during long term storage of the meal; the AV hardly changes during long term storage. The use of NMR to evaluate oxidative deterioration of the oil in brown fish meal was examined. The ratio of olefinic protons to aliphatic protons (Ro) in brown fish meal oil determined by NMR decreased steadily with increasing storage time. By comparison with data from measurements of PV and AV, the Ro was considered to be useful as an index of oxidative deterioration in the oil in brown meal, especially in oil where the PV is peaking. AA

Nemipterus japonicus

1550

Mahesh (T), Setty (TMR), Shetty (TS) and Ravishankar (CN). **Studies on the preparation of functional fish protein concentrate from *Nemipterus japonicus* by enzymatic method.** *Fishery Technology* 30(1): 1993: 57-61

Raw meat, mixed meat and different types of functional fish protein concentrate (FFPC) analysed for proximate composition showed that mixed meat had slightly higher moisture content and lower fat content than raw meat. Mixed meat had higher ash content and reduced protein content. All the 3 types of FFPC had mild sweety flavour and no fishy odour. The products developed could be used for partial replacement of fish meat in the preparation of fish sausages, and products like milk replacers and for fortification of various types of snacks, bread and biscuits. SRA

Sardines

1551

Ravishankar (CN), Setty (TMR) and Shetty (TS). **Studies on the utilization of Indian oil sardine (*Sardinella longiceps*) for the preparation of fish sausages: 1. Effect of washing in water on meat characteristics and sausage quality.** *Fishery Technology* 30(1): 1993: 46-51

Fish sausage samples were subjected to a number of washes and suspension time for each wash, and after each wash they were analysed for proximate composition and reduction in dark colour. For colour improvement and fat reduction 6 washes of 15 min. duration each was found optimum. Loss of protein due to water washing was 14.22% and reduction in fat content was 63.32%. Considerable reduction in water soluble protein (73.91%), non-protein nitrogen (61.29%), trimethylamine (47.61%), volatile base nitrogen (50.20%), FFA (58.0%), peroxide value (36.76%), alpha amino nitrogen (32.71%), and TBA (22.46%), and slight reduction in salt soluble nitrogen (2.9%) were observed, which improved gel strength and shelf life of the meat. SRA

1552

Ravishankar (CN), Setty (TMR) and Shetty (TS). **Studies on the utilization of Indian oil sardine (*Sardinella longiceps*) for the preparation of fish sausages: 2. Effect of sodium bicarbonate treatment on meat characteristics and sausage quality.** *Fishery Technology* 30(1): 1992: 52-56

Effect of sodium bicarbonate concn. ranging from 0.25 to 1.5% along with chilled water wash on pH, proximate composition and colour of fish sausage were studied. Washing meat with 0.5% sodium bicarbonate for 15 min. followed by 5 chilled water washes was optimum. Higher concn. did not improve the removal of fat further but elevated meat pH. There was only a marginal improvement on the % removal of water soluble protein (76.08%), non-protein nitrogen (64.51%), volatile base

nitrogen (54.93%), and peroxide value (42.35%) and slight improvement in the retention of salt soluble nitrogen. SRA

Silver pomfret

1553

Viswanathan Nair (PG). **Lipid peroxidation in silver pomfret muscle at 0 and 10°C.** *Fishery Technology* 30(1): 1993: 28-30

At 10°C, peroxide concn. was higher during the early stages of storage, and decreased after 6 to 8 days, while at the lower temp. it increased till the 19th day. At 10°C the max. peroxide value was 80 m.eq/kg lipid and at 0°C 120 m.eq/kg lipid. SRA

Tuna

1554

Raghunath (MR). **Enzymatic protein hydrolysate from tuna canning wastes-standardisation of hydrolysis parameters.** *Fishery Technology* 30(1): 1993: 40-45

Yellowfin tuna (*Thunnus albacares*) canning wastes, consisting of cooked tuna red meat (TRM) was hydrolysed using pineapple juice as a source of crude bromelain, optimum conditions being 0.008 units enzyme/mg substrate protein, pH 5-6 and temp. 60 - 70°C. Substrate concn. did not influence much on solubilization of solids. A net increase of 47.6 g (62.6%) (SS) and 7 g (92%) (SN) were obtained in 5 h. Final hydrolysate recovered after filtration had the characteristic tuna flavour and little bitterness. Solubilization of TRM was not complete and the residual sugars of the pineapple juice might lead to non-enzymatic browning when the hydrolysate was dried at high temp. SRA

Products

1555

Yu (SY) and Rahman (RA). **Development of surimi noodles.** *Tropical Science* 32(4): 1992: 389-396

Noodles were developed using a formulation based on surimi and technology borrowed from noodle production. Different formulations were tried using the fish *Aristichthys nobilis* R. Sensory evaluation showed that a formulation consisting of 67% fish mince, 17% tapioca flour, 13% water, 2% salt, 1% sodium tripolyphosphate (STPP) and 0.15% monosodium glutamate and pepper was most acceptable. Texture was found to be the most important parameter in surimi noodles. Noodles with a gel strength corresponding to a reading of 3.90 Kgf as measured with the Instron Universal Testing Machine were most acceptable to taste panelists. Texture was also influenced by the pH of the samples. AA

PROTEIN FOODS

Infant foods

1556

Paul (SC) and Mathur (BN). **Storage related changes in protein profiles of low-lactose infant formula in relation to degree of lactose hydrolysis.** *Indian Journal of Dairy Science* 45(4): 1992: 181-189

The investigation was carried out to compare and evaluate the changes in protein profile during storage in relation to the 3 levels of lactose hydrolysis (20, 35 and 50% of total lactose), to ascertain the physico-chemical and nutritional characteristics of spray-dried low-lactose infant formula (LIF) during storage at 37°C. Results indicated that irrespective of the level of lactose hydrolysis, a distinct decrease in the β-lactoglobulin (β-Lg) component of whey protein of LIF with the progress of storage. The loss of β-Lg was proportional to the level of lactose hydrolysis. The storage of LIF did not show any significant effect on the casein profile of LIF. Among other components of protein, only heat sensitive fraction of casein distinctly underwent progressive decrease during storage. SRA

1557

Charu Gupta and Salil Sehgal. **Protein quality of developed home made weaning foods.** *Plant Foods for Human Nutrition* 42(3): 1992: 239-246

Home made weaning foods developed from locally available raw material like bajra, barley, green gram (*Vigna radiata* L.), amaranth grain (*Amaranthus species*) and jaggery using household technologies like roasting and malting had a PER ranging from 2.04 to 2.13, BV 79.56 to 80.69, NPU 66.75 to 67.86, NPR 2.13 to 2.76 and PRE 34.18 to 44.18. The values were comparable to that of cerelac - a commercial weaning food. AA

Non-alcoholic beverages

Cocoa

1558
Aremu (CY) and Abara (AE). **Hydrocyanate, oxalate, phytate, calcium and zinc in selected brands of Nigerian cocoa beverage.** *Plant Foods for Human Nutrition* 42(3): 1992: 231-237

Hydrocyanate, oxalate, phytate, (Ca, Zn were determined in 5 brands of cocoa beverage which were coded NC, BT, PN, CT and CA. Hydrocyanate ranged from 5.40 to 9.64 mg/100g dry matter (DM), oxalate 68 to 146 mg/100 g DM, phytate 590 to 750 mg/100g DM, Ca 28.7 to 116.4 mg/100g DM and Zn 0.516 to 0.675 mg/100g DM. The computed phytate:Zn, Ca:phytate and [Ca] [phytate]/[zinc] molar ratios ranged from 89 to 132, 0.80 to 3.01 and 0.64 to 3.03 respectively. The discussion is focused on toxic levels of hydrocyanate and oxalate, and the significance of the molar ratios in predicting the bioavailability of dietary Zn. AA

Coffee

1559
Balasubramanyam (N). **Trends in packaging of coffee and coffee products.** *Indian Coffee* 57(5): 1993: 17-22

R and D work carried out at Central Food Technological Research Institute, Mysore, India on the packaging and storage of coffee highlighting different aspects of raw coffee seeds (bulk storage, unit packs for coffee seeds), roasted coffee beans, roasted and ground coffee, instant coffee and future trends are presented. SRA

1560
Zanoni (B) and Pagliarini (E). **Coffee ultrafiltration: Composition and shelf-life of the permeate.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 271-274

Fruit juices

Grape juices

1561
Masoodi (FA), Bhupinder (K) and Harinder (K). **Perlette grape juice: 1. Effect of extraction method, SO_2 - concentration and storage on the physico-chemical composition.** *Indian Food Packer* 46(6): 1992: 5-13

Grapes (*Vitis vinifera* L.) cv. Perlette, cultivated in Punjab state, India, crushed and processed under hot and cold-break methods gave juice yield 73 and 72% and the TSS 14.5 and 13°Brix respectively. Hot pressed juice contained 14.7% more tannins than the other. Pectin content decreased by 26.1 and 23.3% in hot and cold pressed juice, during 24 wk of storage. TSS remained unchanged. Hot pressed juice preserved by processing in boiling water showed more browning than cold pressed juice. GS

Kinnow mandarin juices

1562
Ranote (PS), Saini (SPS) and Bawa (AS). **Characteristics of Kinnow mandarin juice and beverage.** *Indian Food Packer* 47(1): 1993: 11-13

The Kinnow mandarin orange juice was suitable for the preparation of ready-to-serve beverage. Juice contained high amounts of total (14.5%) and soluble (13.5 Brix) solids with pleasing aroma and highly attractive colour, and hence highly acceptable in fresh and processed forms. To get better quality juice without bitterness, harvesting must be planned. GS

Orange juices

1563
Moshonas (MG) and Shaw (PE). **Comparison of static and dynamic headspace gas chromatography for quantitative determination of volatile orange juice constituents.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 236-239

Four freshly expressed orange juice samples were analysed by static, dynamic purge and trap headspace GC techniques. The quantities of 16 volatile juice constituents were determined by both methods and the results were compared. Within experimental error, the results for most constituents were comparable for both techniques. The static technique is suitable for routine analysis, but the dynamic technique is more sensitive and, therefore, is potentially more suitable for detailed analysis of trace volatile constituents in orange juice. AA

Plum juices

1564
Joshi (VK), Chauhan (SK) and Lal (BB). **Evaluation of enzymatically extracted plum juice for**

preparation of beverages. *Journal of Food Science and Technology (India)* 30(3): 1993: 208-210

Evaluation of enzymatically extracted plum juice showed that a product with 40% juice and 10°Brix was most acceptable. For nectar, 20% juice with 15°Brix was found to be the optimum. Plum appetizer with added spices extract was liked the most, at all the TSS and juice concn. tried. The physico-chemical, sensory characteristics and details of preparation of the products have been described. AA

Tea

1565
Whitehead (DL) and Temple (CM). **Rapid method for measuring thearubigins and theaflavins in black tea C_{18}** sorbent cartridges. *Journal of the Science of Food and Agriculture* 58(1): 1992: 149-152

Describes the routine use of small inexpensive C_{18} cartridges for rapid separation and accurate measurement of both thearubigins (TR) and theaflavins (TF) in a liquor brewed from black tea. BV

FATS AND OILS

Fats

1566
Kulkarni (AS), Khotpal (RR), Toliwal (SD), Mahabaleswara (N) and Bhakare (HA). **Synthesis of wetting agents: Condensation of some fatty acid hydrazides with some mono and disaccharides.** *Journal of the Oil Technologists Association of India* 34(3): 1992: 89-92

Hydrazides of lauric, myristic, palmitic, 12-hydroxy stearic and oleic acid were condensed with glucose, fructose, lactose and maltose to evaluate the products as wetting agents. The resulting product was solid powder soluble in water, yielding sol. that were capillary active and non-ionic in nature. The wetting power was compared with nonyl aryl polyehoxylate. The condensation products generally exhibited 60 to 70% activity compared to control. AA

1567
Hassel (CA). **Nutritional implications of fat substitutes.** *Cereal Foods World* 38(3): 1993: 142-144

The article briefly examines what fat substitutes are and how these compounds might influence nutritional status and ultimately human health. CSA

Vanaspaties

1568
Gowramma (RV), Mahadeviah (M) and Naresh (R). **Packaging of *vanaspati* in low tin coated cans and cans with lacquered black plate components.** *Journal of Food Science and Technology (India)* 30(3): 1993: 192-195

Two batches of cans with 6 tinplate variables of varying tin coating wt. and surface coatings, were used to pack *vanaspati*. These cans were evaluated by storing at ambient temp. of 25 - 30°C, 37°C and conducting periodical cutout examination by chemical analysis and organoleptic evaluation. E-25 (with lithograph on external surface), E-50 (both sides plain), E-20 and E-25 tinplate cans (with tinplate or black plate lacquered components) coated with lacquer on the internal surface and lacquer or lithography on the external surface, were found suitable for packing *vanaspati*. However, storage for 6 months or longer at high humidity, the external rusting would be more, especially at the seam ends. E-10 cans, even with lacquer coating on both the internal and external surfaces, were not suitable for long storage. AA

Oils

1569
Kulkarni (AS), Khotpal (RR) and Bhakare (HA). **Lipid composition of some non-traditional oilseeds from Vidarbha region: Phospholipid composition of sagargota, pivala kanher and orange seeds.** *Journal of the Oil Technologists Association of India* 24(4): 1992: 117, 119, 121-122

Phospholipid composition of 3 non-traditional oilseeds sagargota (*Caesalpinia bonducella*), pivala kanher (*Thevetia nerlifolia*) and orange (*Citrus sinensis*) as determined by TLC, was phosphatidyl choline, phosphatidyl ethanolamine, phosphatidyl inositol, cardiolipin and unidentified components in the range of 17.2 - 25.2, 25.6 - 28.3, 30.1 - 30.6, 16.3 - 24.0 and 0 - 1.8% respectively. The fatty acid compositions of the component phospholipids as determined by GLC indicate that oleic acid is predominant in all except phosphatidyl choline, followed by palmitic, stearic and linoleic acids. AA

1570
Handoo (SK), Bagga (KK) and Agrawal (TN). **Properties of groundnut-mustard and**

sunflower-mustard oil blends. *Journal of the Oil Technologists Association of India* 24(4): 1992: 123, 125, 127, 129, 131, 133, 135-136

Quality characteristics and shelf-life of groundnut oil: mustard oil blend (GN:MU) and sunflower oil: mustard oil (SF:MU) blend were studied. In both the blends a steady rise in free fatty acid, fall in iodine value and colour and increasing trends in peroxide values were observed, the changes being faster in SF:MU than GN:MU. The blend 70:30 of GN:MU and SF:MU showed greater acceptability. The thermal stability of sunflower oil increased with the mustard oil blend at 180°C while the thermal stability of groundnut oil did not change with the blend. GS

1571

Bhakare (HA), Khotpal (RR), Saha (SK) and Kulkarni (AS). **GLC studies in some seed oils.** *Journal of the Indian Chemical Society* 69(10): 1992: 696-697

GLC detn. of fatty acid composition of seed oils of *Cassia fistula*, *Nigella sativa* and *Acaccia catechu* showed that the fatty acids (%) in *C. fistula* were myristic 0.12, myristoleic 0.09, palmitic 17.03, palmitoleic 0.02, stearic 3.17, oleic 18.18, linolenic 3.30, linoleic 56.99, arachidonic 0.34 and lignoceric 0.07. In *A. catechu* % myristic was 0.14, myristoleic 0.03, palmitic 20.43, palmitoleic 0.18, stearic 2.63, oleic 38.85, linolenic 0.92, linoleic 35.70, arachidonic 0.02%, behenic 0.95, lignoceric 0.15, and in *N. sativa*. % myristic was 0.19, palmitic 12.46, palmitoleic 0.20, stearic 1.81, oleic 24.46, linoleic 57.63, linolenic 0.57, arachidic 0.19, arachidonic 2.49. SRA

1572

Siddiqui (IA). **Self-reliance in vegetable oils.** *Oils and Oilseeds Journal* 44(8-11): 1992: 10-24

Outlines the long-term, medium term and short term measures to achieve self-sufficiency in the production of vegetable oils; and also the role of cooperatives in enhancing their production. GS

1573

Dhan Prakash, Pashupati Nath and Pal (M). **Protein, fat and fatty acid composition of *Celosia* species.** *Journal of the Science of Food and Agriculture* 58(1): 1993: 143-144

The seeds of 13 lines of *Celosia* referable to 4 species were analysed for protien, fat and fatty acid composition. The protein contents varied from 101 to 170 g kg^{-1} and fat contents from 56 to 109 g kg^{-1}. The fatty acid composition was of the simple palmitic-oleic-linoleic type. AA

1574

Ogbobe (O). **Physico-chemical composition and characterisation of the seed and seed oil of *Sclerocarya birrea*.** *Plant Foods for Human Nutrition* 42(3): 1992: 201-206

The physicochemical composition of *S. birrea* was assessed by standard methods and was found to contain 11.0% crude oil, 17.2% carbohydrate, 36.70% crude protein, 3.4% fibre and 0.9% crude saponins. The fatty acid distribution in the seed oil was obtained by fractionating the volatised fatty acid by GC-MS. The oil is made up of nine fatty acids of which palmitic, stearic and arachidonic acids are the most dominant. AA

Amaranthus paniculatus

1575

Daulatabad (CMJD) and Hosamani (KM). **Epoxy and cyclopropenoid fatty acids in *Amaranthus paniculatus* seed oil.** *Journal of the Science of Food and Agriculture* 58(1): 1992: 139-141

Amaranthus paniculatus (L) syn *Amaranthus caudatus* (L) seed oil contains palmitic (19.4%), stearic (3.9%), oleic (21.9%), linoleic (43.9%), vernolic (7.8%), malvalic (1.5%) and sterculic (1.6%) acids. These fatty acids were characterised by IR, NMR, MS and GLC techniques and by chemical degradations. AA

Groundnut oils

1576

Gowramma (RV), Mahadeviah (M) and Naresh (R). **Studies on the suitability of used tinplate container for packing groundnut oil.** *Journal of Food Science and Technology (India)* 30(3): 1993: 180-182

Storage quality of groundnut oil, packed in used tin containers (TC), was studied over a period of 13 months and compared with that of the oil packed in TC. The data on the profiles of free fatty acids, peroxide value, Kries test and sensory evaluation indicated that the fresh TC were safe for long storage of 12 months at 37°C, in contrast to the short-shelf-life of 3 - 4 months at 37°C in case of used TC. AA

1577

Handoo (SK), Gupta (S) and Agrawal (TN). **Properties of groundnut and cottonseed oil blends.** *Journal of the Oil Technologists Association of India* 34(3): 1992: 83-87

Pure groundnut and cottonseed oils on storage for 6 months in PET, PVC and HDPE containers showed

small steady rise in peroxide value, free fatty acids and fall in iodine value and colour, with a similar trend in oil blends which were thermally stabler. The shelf-life of 50:50 blend of cottonseed oil and groundnut oil was comparable to pure groundnut oil. The ratio of oleic to linoleic acid increased with the % of groundnut oil in the blends depicting their greater resistance to auto oxidation compared to the pure cottonseed oil. Heated (180°C) and fried (20 min) oils and oil blends showed significant rise in peroxide value, colour and fall in iodine value. Taste panel scores of 9 - 10 for fresh oils and blends reduced to 4 - 5 scores after stored for 6 months. SD

Palmyrah

1578
Velu (G). **Fruit and seed variability in palmyrah.** *Madras Agricultural Journal* 79(4): 1992: 225-226

Twenty fully matured single, double and triple seeded fruits collected from each of seventy female palmyrah palms were analysed for fruit wt., mesocarp, individual seed wt., length, breadth and thickness of seed and the ratios between fruit to seed, mesocarp to seed and mesocarp to fruit. A wide variation was observed in fruit, mesocarp and individual seed wt. There were significant differences in length and thickness of seed but not in breadth. GS

Rice bran oils

1579
Anthoni Raj (S) and Singaravadivel (K). **Kinetics of FFA increase in raw rice bran.** *Madras Agricultural Journal* 79(5): 1992: 298-300

Extent to which free fatty acids (FFA) increases in raw rice bran and the time length to which it can await stabilization or oil extraction were studied. The FFA content in raw bran increased by 0.1 to 0.3% only within an hr after milling. Raw bran could stand storage for a day or two without any rapid increase in FFA and an edible grade oil can be produced after extraction. GS

Terminalia pallida

1580
Sundarsanam (G) and Banerji (R). ***Terminalia pallida* - a new source of oil.** *Journal of the Oil Technologists Association of India* 34(3): 1992: 81

Oil from *T. pallida* fruit seed collected from Tirumala hills in Andhra Pradesh was analysed for its fat and fatty acid composition. Palmitic (27.3%) and oleic (54.2%) acids were the major, besides small amount of pentadecanoic, octadecanoic, and octadecadienoic acids. The ratio of saturated and unsaturated fatty acids was found to be 0.72%. GS

SPICES AND CONDIMENTS

Spices

1581
Krishnakantha (TP) and Lokesh (BR). **Scavenging of superoxide anions by spice principles.** *Indian Journal of Biochemistry and Biophysics* 30(2): 1993: 133-134

Effect of spice principles on scavenging of superoxide anion was investigated. Superoxide anions, as measured by nitrobluetetrazolium (NBT) reduction in xanthine-xanthine oxidase system, were inhibited by superoxide dismutase, spice principles eugenol (cloves) and cuminaldehyde (cumin), antioxidants, BHT and BHA in a dose-dependent manner. K_i values for the inhibition of NBT reduction by eugenol and cuminaldehyde were 64 µM and 120 µM respectively. Zingerone (ginger) and linalool (coriander) inhibited NBT reduction to a max. of 23 and 28% respectively. However, piperine (black pepper) and turmeric extracts (aqueous and acid) failed to scavenge superoxide anions. AA

Capsicum

1582
Verghese (J), Balakrishnan (KV) and Kurian (T). **Profile of quality determinants in capsicum extract processing.** *Indian Spices* 29(3): 1992: 4-5, 7, 9-11

This appraisal encompasses the quality determinants relevant to capsicum extract processing. Pungency, colour, fixed (fatty) oil which are involved in the manufacture of capsicum extractives are reviewed. SRA

Chillies

1583
Gupta (AK), Tomar (MC), Singh (UB) and Surjeet Singh. **Steeping preservation of red chillies for the preparation of stuffed chilli pickle.** *Indian Food Packer* 46(6): 1992: 47-52

Red chillies (*Capsicum annum* L.) immersed in a liquid containing 10.0% salt, 1.0% acetic acid, 0.1% calcium chloride and 500 p.p.m. SO_2 were found

suitable for stuffed chilli pickle as they retained bright red colour and pungency even after 9 months. GS

1584
De (AK). **The wonders of chilli.** *Indian Spices* 29(3): 1992: 15-19

Aspects like occurrence, structure, chemistry, structure-activity relationship, biosynthesis, biological significance, metabolism, toxicity, physiological effects, mechanism of capsaicin action, future therapeutic uses of capsaicin are reviewed. 32 references. SRA

Fenugreek

1585
Mukti Bajaj, Poonam Aggarwal, Minhas (KS) and Sidhu (JS). **Effect of blanching treatments on the quality characteristics of dehydrated fenugreek leaves.** *Journal of Food Science and Technology (India)* 30(3): 1993: 196-198

Different blanching treatments were given to fenugreek *Trigonella foenumgraecum* leaves to get better quality dried product. Results showed that the ascorbic acid retention was highest in potassium metabisulphite (0.5%) treated sample, while chlorophyll retention and quality scores were highest in water-blanched samples, immediately after dehydration. Six months storage showed best retention of ascorbic acid in unblanched samples, while retention of chlorophyll was max. in magnesium oxide (0.1%) treated samples. AA

Paprika

1586
Wilkins (CK). **Paprika: Relationships between aroma profile data and both GC and HPLC data.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 212-218

1587
Wilkins (CK). **The influence of storage conditions on spice paprika quality.** *Lebensmittel-Wissenschaft und - Technologie* 25(3): 1992: 219-223

The influence of UV light, elevated temp. and storage atm. on paprika was investigated by the measurement of total pigment content, tristimulus colour analysis, headspace GC and sensory analysis. Tristimulus colour analysis could distinguish between fresh and aged samples. However, no simple relationship was found between tristimulus colour and total pigment content. Sensory evaluations revealed significant differences within the storage series but the variations in most cases were within the range observed for good quality fresh samples. Principal component analysis of headspace GC allowed clear differentiation between good quality and lower quality samples. Consequently, tristimulus colour measurement is suggested as a rapid method for quality evaluation. AA

Tamarind

1588
Lingappa (K), Padshetty (NS) and Chowdary (NB). **Tamarind *vermouth* - a new alcoholic beverage from tamarind (*Tamarindus indica*).** *Indian Food Packer* 47(1): 1993: 23-26

Reports the utilization of tamarind fruit wines for the preparation of *vermouth* an alcoholic fruit beverage. pH, total acidity, alcohol and total phenols of the four tamarind vermouth samples compared well with the earlier reported fruit vermouth values. All the 4 tamarind vermouths prepared with 4 herbs mixture formulae were acceptable. The dry vermouth prepared from herb mixture (formula I) and the sweet vermouth prepared from herbs mixture (formula III) were judged as the best. GS

SENSORY EVALUATION

Nil

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

1589
Sone Lal, Doharey (RB), Ashok Kumar and Shiv Shankar. **Field trials with deltamethrin, fenitrothion and malathion against stored grain insect pests in commercial warehouses.** *Bulletin of Grain Technology* 29(3): 1991: 133-137

Field trials with deltamethrin (2.5% W.P.) at 30 mg a.i./m^2; and fenitrothion (50% EC) and malathion (50% EC) at 0.15 g a.i./m^2 against stored grain insect pests were conducted in Food Corporation of India depot at Hadwani, Uttar Pradesh, India on unfumigated wheat stock having moisture content 13.3 to 13.9% at temp. ranging from 29 to 30°C and

RH 75 to 80%. 100% mortality against *Sitophilus oryzae* (L.) and *Tribolium castaneum* (Herbst.) was observed with deltamethrin and fenitrothion while 90% against these insects with malathion after 15 days of treatment. However, after 30 days of treatment, the mortality recorded was 90, 80 and 70% against above insects with malathion and after 15 days of treatment, the mortality recorded was 90, 80 and 70% against above insects with deltamethrin, fenitrothin and malathion, respectively. The overall order of effectiveness observed was deltamethrin, fenitrothin, malathion. AA

1590

Morrison (WP). **Foreign market development report on food safety pesticide regulations and usage patterns on wheat in the USA.** *Bulletin of Grain Technology* 29(3): 1991: 163-165

Activities of the Environmental Protection Agency, Food and Drug Administration and USDA, the three federal agencies responsible for food safety in USA, the regulating aspects of pesticides and the general usage pattern of these chemicals in wheat production are discussed. GS

1591

Barson (G). **Laboratory assessment of the residual toxicity of commercial formulations of insecticides to adult *Oryzaephilus surinamensis* (Coleoptera: Silvanidae) exposed for short time intervals.** *Journal of Stored Products Research* 27(4): 1991: 205-211

Adult *Oryzaephilus surinamensis* from an insecticide resistant and a susceptible strain were exposed for fixed periods of time (within the range 0.5, 1, 2, 4, 8, 16, 24 and 32 min; 1, 2, 4, 8, 16 and 24 h) to filter papers treated with commercially formulated insecticides of fenitrothion, chlorpyrifosmethyl, pirimiphos-methyl or etrimfos at a dose of 250 mg active ingredient per m^2. The emulsion concentrate (ec) and wettable powder (wp) formulations of fenitrothion produced a delayed toxic response, but were the most toxic insecticide formulations to the lab. susceptible strain, the ET_{99} (exposure time) being 0.54 and 0.38 h respectively at the 24 h assessment period. Etrimfos 50% ec was the most toxic formulation to the 0213 resistant strain, with an ET_{99} value of 6.9 h, whereas the other formulations required much longer exposures, the ET_{99} values being > 16 h. The 0213 strain was resistant to all the formulations tested, with high level of resistance to fenitrothion ec (x 31) and wp (x 162) at the ET_{99} level. Wettable powder formulations of fenitrothion and chlorpyrifos-methyl required shorter exposures than their respective ec formulations for kill of the susceptible strain. The implications of the results on the survival of *O. surinamensis* in grain stores are discussed. AA

1592

Weaver (DK), Dunkel (FV), Ntezurubanza (L), Jackson (LL) and Stock (DT). **The efficacy of linalool, a major component of freshly-milled *Ocimum canum* Sims (Lamiaceae), for protection against postharvest damage by certain stored product Coleoptera.** *Journal of Stored Products Research* 27(4): 1991: 213-220

1593

Mitchell (R). **The traits of a biotype of *Callosobruchus maculatus* (F.) (Coleoptera: Bruchidae) from South India.** *Journal of Stored Products Research* 27(4): 1991: 221-224

The South Indian strain of *Callosobruchus maculatus* (F.), which has been in culture for 10 yr, cannot be distinguished from 3 cultures established from beetles collected in South India in 1989. These cultures represent a geographic biotype of *C. maculatus* that is widely distributed in the state of Tamil Nadu, India and is stable in culture. Females of the biotype disperse their eggs uniformly, lay eggs on larger beans first, have their oviposition inhibited if beans already carry eggs, and the larvae exhibit contest competition. Fecundity varies greatly within and between cultures. The extremes of fecundity have less effect on the contribution of offspring to the next generation than the elimination of intraspecific competition by selective oviposition. AA

1594

Sujatha (PS) and Aparna Dutta-Gupta. **Feeding and 20-hydroxyecdysone treatment reverses the effect of starvation on total haemocyte count in larval forms of *Corcyra cephalonica* (Lepidoptera).** *Journal of Stored Products Research* 27(4): 1991: 245-247

Starvation during the larval development prevented the normally occurring increase in the total haemocyte number in *Corcyra cephalonica*. This effect was reversed either by resumption of feeding or by the application of exogenous 20-hydroxyecdysone. AA

1595

Ryan (RF). **Attaining insect-free and residue-free status in foods.** *Food Australia* 44(12): 1992: 556-557

The use of the non-flammable gaseous phosphine mixture phosfume^{TM} dispensed via a gastight pipework distribution systems, enables fumigation

to carry out more effectively than conventional phosphine treatments and offers improved operator safety , accurately controllable dosage and elimination of fire hazard. The efficacy of phosphine allows the use of low concn. with resultant min. residue level (0.001 p.p.m.) remaining in the treated foodstuff. Only controlled atm. storage would give improved residue levels but at a tenfold increase in fumigation cost. AA

1596

Wahlqvist (ML). **Non-nutrients in foods: Implications for the food industry.** *Food Australia* 44(12): 1992: 558-560

Review article covers briefly the non-nutrients in foods, texture and food physico-chemistry, colour, taste and smell, compounds of physiological importance (chemical, physiological) and potential therapeutic or pharmacological properties. 13 references. SRA

BIOCHEMISTRY AND NUTRITION

1597

Dore Raju (MR), Vijayalakshmi (K) and Karuna Kumar (M). **Influence of dietary protein on aminotransferases and phosphatases in rat tissues.** *Journal of Food Science and Technology (India)* 30(3): 1993: 183-186

In albino rats, fed *ad libitum* with diets containing 5, 16, 32 and 48% dietary protein for 45 days, the liver mitochondrial an supernatant alanine aminotransferase activities increased at higher levels of protein, but the activities showed a decline in serum. The aspartate aminotransferase levels in mitochondria increased at higher protein levels, whereas the supernatant enzyme was enhanced only in the case of 32 and 48% dietary protein-fed groups. The activities of these enzymes in kidney and heart cell fractions were not influenced by the level of protein. The alkaline phosphatase activities in serum and liver were lower in rats fed on high protein diets, whereas the acid phosphatase activities were not affected. AA

1598

Arti Duhan, Chauhan (BM) and Darshan Punia. **Nutritional value of some non-conventional plant foods of India.** *Plant Foods for Human Nutrition* 42(3): 1992: 193-200

Thirteen non-conventional foods including fruits, leaves and grains consumed in various parts of the Indian subcontinent were analysed for their nutritional value. Khejri beans (*Prsopsis cineria*), Pinju (*Capparis decidua*) and Kachri (*Cucumis species*) contained considerable amounts of protein (15 - 18%). Kachri was rich in fat (13%). Bhakri (*Tribulus terristris*), Gullar (*Ficus glomerata*) and Peehi (*Salvadora oleoides*) were found to be rich sources of Ca; Gullar contained about 15 times the amount of Ca present in wheat. P content of Santhi *Boernavia diffusa*), Khejri beans, Bhakri, Pinju and Lehsora (*Cordia dichotoma*) were noticeable. Zinc was present in high amounts in Peepalbanti (Ficus religiosa) and Gullar; as was Fe in Shanti and Bhakri and manganese in Santhi. Besides Fe, Zn and Ca, Pinju contained appreciable amounts of β-carotene and vitamin C. However, Santhi contained high amounts of oxalic acid. AA

1599

Antai (SP) and Obong (US). **The effect of fermentation on the nutrient status and on some toxic components of *Icacinia manni*.** *Plant Foods for Human Nutrition* 42(3): 1992: 219-224

The effect of fermentation on the nutrient status and on some toxic components of *I. manni* was investigated. Chemical analysis of both unfermented and fermented products revealed an increase in protein, ash and fibre content while the lipid and carbohydrate content showed a decrease. The results indicated that fermentation resulted in protein enrichment of the fermented *I. manni* mash. Fermentation was also observed to cause a marked decrease in the level of some toxic components (oxalic acid, phytic acid and hydrocyanic acid) of the product. The possibility of incorporating *I. manni* among the edible starchy plant tubers is discussed. AA

1600

Asha Kawatra, Bhat (CM) and Asha Arora. **Effect of Isabgol husk supplementation on trace minerals (Zn, Cu, Mn) levels in adolescent girls.** *Plant Foods for Human Nutrition* 42(3): 1992: 225-230

The study was conducted on 11 healthy non-anaemic adolescent girls of 16 to 18 yrs of age. Balance studies were conducted in two trials of 3 wks each on low and high fibre diets. High fibre diet contained 25 g Isabgol husk in addition to low fibre diet. The mean diet and nutrient intakes of the subjects were approx. the same during both trials. Addition of Isabgol husk to low fibre diet significantly (P less than or equal to 0.05) increased faecal excretion of Zn, Cu and Mn and lowered their apparent retention. The serum levels of these trace minerals decreased significantly (P less than or equal to 0.05). Thus the high level of Isabgol has undesirable effect on trace minerals. AA

1601

Shimizu (M), Nakama (A), Yamano (T), Noda (T), Fujita (T), Kuroda (K), Yamada (A), Morita (S). **Role of gastric glutathione in smoke flavouring-induced gastric injury in rats.** *Food and Chemical Toxicology* 30(12): 1992: 1005-1009

Some commercial liquid smoke flavourings have been shown to induce acute gastric mucosal injury in rats when given orally as a large single dose. The present study was carried out to examine the mechanism of action in rats of two selected smoke flavourings containing about 10% total acids as acetic acid. These flavourings and 10% acetic acid decreased the concn. of glutathione (GSH) in the glandular stomach. The decrease in gastric GSH was coupled with smoke flavourings-induced gastric injury. Pretreatment with N-ethylmaleimide, a GSH depletor enhanced acetic acid-induced gastric injury. Pretreatment with cysteine, a sulphydryl compound, protected rats against smoke flavouring-induced gastric injury. Aqueous fractions of the smoke flavourings, after removal of non-polar compounds and acidic organic compounds (including acetic aicd) by diethyl ether extraction, decreased the gastric GSH concn. considerably and had a marked reactivity *in vitro* with GSH, but these fractions by themselves showed no ability to induce gastric injury. Addition of 10% acetic acid to these aqueous fractions caused greater gastric injury than 10% acetic acid alone, which suggests that these aqueous fractions contain the (unidentifed) compound(s) that facilitate acetic acid-induced gastric injury. These findings indicate that gastric endogenous and endogenous and excogenous sulphydryls play an important part in gastric cytoprotection. AA

TOXICOLOGY

1602

Dhingra (MN). **Mycotoxins.** *Poultry Guide* 30(4): 1993: 17-18

Mycotoxins are dangerous to birds, being carcinogenic and cause destruction of vitamins. Hence, use of organic acid salts like propionates, formates, acetates with Gention violet, and specially treated zeolites and dimethyl esters of fumaric acid to prevent the growth of fungi is suggested. Use of care-T, an antifungal compound is found to be cost effective in egg production. GS

1603

Yuan (JH), Dieter (MP), Bucher (JR) and Jameson (CW). **Toxicokinetics of cinnamaldehyde in F344 rats.** *Food and Chemical Toxicology* 30(12): 1992: 997-1004

The toxicokinetic profile of cinnamaldehyde (CNMA) was investigated in Fishcher 344 rats. CNMA was found to be unstable in blood. After iv administration, a large fraction of CNMA was immediately oxidized to cinnamic acid. The biological half-life of CNMA after iv administration was found to be 1.7 h. After administration by gavage of CNMA at 250 or 500 mg/kg body wt. using corn oil as vehicle, the max. blood concn. of CNMA were in the order of 1 μg/ml. These low blood concn. were maintained over a 24 h period after a dose of 500 mg/kg, which is relatively long considering the short (1.7 h) biological half-life of CNMA. The estimated oral bioavailability of CNMA was < 20% for both the 250 and 500 mg/kg doses. No CNMA was present in blood at any time in rats dosed with 50 mg CNMA/kg body wt. Only a small amount of the administered CNMA was excreted in rat urine as free cinnamic acid or β-glucuronide-conjugated cinnamic acid. The majority of CNMA administered orally was excreted in urine as hippuric acid within 24 h. The max. excretion rate occurred at 8 h after gavage. Hippuric acid recovered in 50 h urine samples was found to be directly proportional to the oral dose of CNMA. AA

FOOD LAWS AND REGULATIONS

1604

Harris (RK) and Haggerty (WJ). **Assays for potentially anticarinogenic phytochemicals in flaxseed.** *Cereal Foods World* 38(3): 1993: 147-151

The methods that were developed to extract and quantify lignans in raw flaxseed powder is discussed and the storage stability of flaxseed flour is assessed in this article. CSA

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